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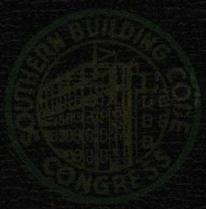

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We believe that the building progress of the South can best be served by a Modern Building Code, written and maintained up-to-date by a Southern Association.

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CHAPTER I—ADMINISTRATION

SECTION 101—TITLE AND SCOPE

101.1 — TITLE

The provisions embraced within the following chapters and sections shall constitute and be known and may be cited as "The Building Code" hereinafter referred to as "this code."

101.2 — CODE REMEDIAL

This code is hereby declared to be remedial, and shall be construed to secure the beneficial interests and purposes thereof—which are public safety, health, and general welfare—through structural strength, stability, sanitation, adequate light and ventilation, and safety to life and property from fire and other hazards incident to the construction, alteration, repair, removal, demolition, use and occupancy of buildings, structures, or premises.

101.3 — SCOPE

(a) The provisions of this code shall apply to the construction, alteration, repair, equipment, use and occupancy, location, maintenance, removal and demolition, of every building or structure or any appurtenances connected or attached to such buildings or structures.

(b) No provision of this code shall be held to deprive any federal or state agency, or any municipal authority having jurisdiction, of any power or authority which it had on the effective date of this act or of any remedy then existing for the enforcement of its orders, nor shall it deprive any individual or corporation of its legal rights as provided by law.

101.4 — EXISTING BUILDINGS

(a) If, within any period of twelve months, alterations or repairs costing in excess of fifty percent of the then physical value of the building are made to an existing building, such building shall be made to conform to the requirements of this code for new buildings, also that for buildings located in fire districts the provisions of Sections 302.1 and 302.2 shall apply.

(b) If an existing building is damaged by fire or otherwise in excess of fifty percent of its then physical value before such damage is repaired, it shall be made to conform to the requirements of this code for new buildings.

(c) If the cost of such alterations or repairs, or the amount of such damage, is more than twenty-five but not more than fifty percent of the then physical value of the building, the portions to be altered or repaired shall be made to conform to the requirements of this code for new buildings to such extent as the Building Official may determine.

(d) For the purpose of this section physical value of the building shall be determined by the Building Official.

(e) If the occupancy of an existing building is entirely changed the building shall be made to conform to the requirements of this code for the new occupancy. If the occupancy of only a portion of an existing building is changed and that portion is separated from the remainder as specified in Section 412, then only such portion need be made to conform.

(f) Repairs and alterations, not covered by the preceding paragraphs of this section, restoring a building to its condition previous to damage or deterioration, or altering it in conformity with the provisions of this code or in such manner as will not extend or increase an existing non-conformity or hazard, may be made with the same kind of materials as those of which the building is constructed; but not more than twenty-five percent of the roof covering of a building shall be replaced in any period of twelve months unless the entire roof covering is made to conform with the requirements of this code for new buildings.

101.5 — MAINTENANCE

All buildings or structures, both existing and new, and all parts thereof, shall be maintained in a safe and sanitary condition. All devices or safeguards which are required by this code in a building when erected, altered, or repaired, shall be maintained in good working order. The owner, or his designated agent, shall be responsible for the maintenance of buildings and structures.

SECTION 102 — ORGANIZATION

102.1 — BUILDING OFFICIAL

(a) There is hereby established in the City a department to be called the Building Department, which shall be in charge of a Building Official.

(b) The Building Official shall have had at least ten years' experience as an architect, engineer, building inspector, building contractor, or superintendent of building construction, for five years of which he shall have been in responsible charge of work. He shall be appointed by the Chief Appointing Authority of the municipality. His appointment shall continue during good behavior and satisfactory service. He shall not be removed from office except for cause after full opportunity has been given him to be heard on specific charges before such Chief Appointing Authority.

102.2 — INSPECTORS

The Building Official, with the approval of the Chief Appointing Authority of the municipality, may appoint such number of officers, inspectors, assistants, and other employees as shall be authorized from time to time. No person shall be appointed as inspector of construction who has not had at least five years' experience as a Building Inspector, builder, engineer, architect, or as a superintendent, foreman, or competent mechanic in charge of construction.

102.3 — DEPUTY

The Building Official may designate as his deputy an employee in the department who shall, during the absence or disability of the Building Official exercise all the powers of the Building Official.

102.4 — RESTRICTIONS ON EMPLOYEES

No officer or employee connected with the department, except one whose only connection is as a member of the board, established by this act, shall be financially interested in the furnishing of labor, material, or appliances for the construction, alteration, or maintenance of a building, or in the making of plans or of specifications therefor, unless he is the owner of such building. No such officer or employee shall engage in any work which is inconsistent with his duties or with the interests of the department.

102.5 — RECORDS

The Building Official shall keep, or cause to be kept, a record of the business of the department. The records of the department shall be open to public inspection.

SECTION 103 — POWERS AND DUTIES OF BUILDING OFFICIAL

103.1 — RIGHT OF ENTRY

The Building Official shall enforce the provisions of this code, and he, or his duly authorized representative, may enter any building, structure, or premises in the City to perform any duty imposed upon him by this code.

103.2 — STOP WORK ORDERS

Upon notice from the Building Official that work on any building or structure is being done contrary to the provisions of this code or in a dangerous or unsafe manner, such work shall be immediately stopped. Such notice shall be in writing and shall be given to the owner of the property, or to his agent, or to the person doing the work, and shall state the conditions under which work may be resumed. Where an emergency exists, no written notice shall be required to be given by the Building Official.

103.3 — REVOCATION OF PERMITS

The Building Official may revoke a permit or approval, issued under the provisions of this act, in case there has been any false statement or misrepresentation as to a material fact in the application or plans on which the permit or approval was based.

103.4 — UNSAFE BUILDINGS

All buildings or structures which are unsafe, unsanitary, or not provided with adequate egress, or which constitute a fire hazard,

or are otherwise dangerous to human life, or which in relation to existing use constitute a hazard to safety or health by reason of inadequate maintenance, dilapidation, obsolescense, or abandonment, are, severally in contemplation of this section, unsafe buildings. All such unsafe buildings are hereby declared illegal and shall be abated by repair and rehabilitation or by demolition in accordance with the following procedure:

(a) Whenever the Building Official shall find any building or structure or portion thereof to be unsafe, as defined in this section, he shall, in accordance with established procedure for legal notices, give the owner, agent, or person in control of such building or structure written notice stating the defects thereof. This notice shall require the owner within a stated time either to complete specified repairs or improvements, or to demolish and remove the building or structure or portion thereof.

(b) If necessary, such notice shall also require the building, structure or portion thereof to be vacated forthwith and not reoccupied until the specified repairs and improvements are completed, inspected and approved by the Building Official. The Building Official shall cause to be posted at each entrance to such building a notice: "THIS BUILDING IS UNSAFE AND ITS USE OR OCCUPANCY HAS BEEN PROHIBITED BY THE BUILDING OFFICIAL." Such notice shall remain posted until the required repairs are made or demolition is completed. It shall be unlawful for any person, firm or corporation or their agents, or other servants, to remove such notice without written permission of the Building Official, or for any person to enter the building except for the purpose of making the required repairs or of demolishing same.

(c) The owner, agent or person in control shall have the right, except in cases of emergency, to appeal from the decision of the Building Official, as provided hereinafter, and to appear before the Board of Adjustments and Appeals at a specified time and place to show cause why he should not comply with said notice.

(d) In case the owner, agent, or person in control cannot be found within the stated time limit, or, if such owner, agent, or person in control shall fail, neglect, or refuse to comply with notice to repair, rehabilitate, or to demolish and remove said building or structure or portion thereof, the Building Official, after having ascertained the cost, shall cause such building or structure or portion thereof, to be demolished, secured, or required to remain vacant.

(e) The decision of the Building Official shall be final in cases of emergency which, in his opinion, involve imminent danger to human life or health. He shall promptly cause such building, structure, or portion thereof to be made safe or removed. For this purpose he may at once enter such structure or land on which it stands, or abutting land or structures, with such assistance and at such cost as he may deem necessary. He may vacate adjacent structures and protect the public by appropriate fence or such other means as may

be necessary, and for this purpose may close a public or private way.

(f) Costs incurred under paragraphs 103.4(d) and 103.4(e) shall be charged to the owner of the premises involved and shall be collected in the manner provided by law.

103.5 — REQUIREMENTS NOT COVERED BY CODE

Any requirement necessary for the strength or stability of an existing or proposed building or structure, or for the safety of the occupants thereof, not specifically covered by this code, shall be determined by the Building Official subject to appeal to the Board of Adjustments and Appeals.

103.6 — ALTERNATE MATERIALS AND ALTERNATE METHODS OF CONSTRUCTION

The provisions of this code are not intended to prevent the use of any material, or method of construction not specifically prescribed by this code, provided any such alternate has been approved and its use authorized by the Building Official. The Building Official shall approve any such alternate, provided he finds that the proposed design is satisfactory and complies with the provisions of Chapter XII, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in the code in quality, strength, effectiveness, fire-resistance, durability, and safety. The Building Official shall require that sufficient evidence or proof be submitted to substantiate any claim that may be made regarding its use. If, in the opinion of the Building Official, the evidence and proof are not sufficient to justify approval, the applicant may refer the entire matter to the Board of Adjustments and Appeals as specified in Section 111.

103.7 — LIABILITY

Any officer or employee, or member of the Board of Adjustments and Appeals, charged with the enforcement of this code, acting for the City in the discharge of his duties, shall not thereby render himself liable personally, and he is hereby relieved from all personal liability for any damage that may accrue to persons or property as a result of any act required or permitted in the discharge of his duties. Any suit brought against any officer or employee because of such act performed by him in the enforcement of any provision of this code shall be defended by the Department of Law until the final termination of the proceedings.

103.8 — REPORTS

The Building Official shall annually submit a report to the Chief Administrator covering the work of the department during the preceding year. He shall incorporate in said report a summary of the decisions of the Board of Adjustments and Appeals during said year.

SECTION 104 — TESTS

The Building Official may require tests or test reports as proof of compliance. Tests, if required, are to be made at the expense of the owner, or his agent, by an approved testing laboratory or other approved agency. Copies of such test reports or the results of all such tests shall be kept on file in the office of the Building Official.

SECTION 105 — APPLICATION FOR PERMIT

105.1 — WHEN REQUIRED

(a) Any owner, authorized agent, or contractor who desires to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, or construct a sign of any description, or to install or alter fire-extinguishing apparatus, elevators, engines, or to install a steam boiler, furnace, heater, incinerator, or other heat producing apparatus, or other appurtenances, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the Building Official and obtain the required permit therefor.

(b) A general permit shall carry with it the right to install in any building or structure, or part thereof, heating apparatus, elevators, sidewalk elevators, vaults, chutes, coal holes, lifts, cranes, derricks, steam power boilers, steam, oil, gas or vapor engines, provided the same are shown on the drawings and set forth in the specifications filed with the application for the permit; but where these are not shown on the drawings and covered by the specifications submitted with said application, special permits shall be required.

(c) Ordinary minor repairs may be made with the approval of the Building Official without a permit; provided that such repairs shall not violate any of the provisions of this code.

(d) Where construction is commenced before a Permit is obtained, the Permit Fees shall be doubled.

105.2 — FORM

(a) Each application for a permit with the required fee, shall be filed with the Building Official, on a form furnished by him, and shall contain a general description of the proposed work and its location. The application shall be signed by the owner, or his authorized agent.

(b) Each application for a permit shall indicate the proposed occupancy of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure, and shall contain such other information as may be required by the Building Official.

105.3 — DRAWINGS AND SPECIFICATIONS

(a) When required by the Building Official, two or more copies of specifications, and of drawings drawn to scale with sufficient clarity and detail to indicate the nature and character of the work, shall

accompany every application. Such drawings and specifications shall contain information, in the form of notes or otherwise, as to the quality of materials, where quality is essential to conformity with this code. Such information shall be specific, and this code shall not be cited as a whole or in part, nor shall the term "legal" or its equivalent be used, as a substitute for specific information.

(b) The Building Official may require details, computations, stress diagrams, and other data necessary to describe the construction and basis of calculations and they shall bear the signature of the person responsible for the design.

(c) All drawings and specifications for buildings and structures shall bear the signature of the owner or his agent.

105.4 — PLOT DIAGRAM

The Building Official shall require drawings showing the location of the proposed building or structure and of every existing building or structure on the site or lot. He may also require a boundary line survey, if necessary, prepared by a qualified surveyor.

105.5 — LIMITATION

An application for a permit for any proposed work shall be deemed to have been abandoned six months after the date of filing, unless before then a permit shall have been issued; provided that, for cause, one or more extensions of time for periods of not exceeding ninety days each may be allowed by the Building Official.

105.6 — EXAMINATION OF DRAWINGS

(a) The Building Official shall examine or cause to be examined each application for permit and the drawings and computations filed therewith and shall ascertain by such examinations whether the construction indicated and described is in accordance with the requirements of this code and all other pertinent laws or ordinances.

(b) **Permits issued upon Architects or Engineers affidavit.** The Building Official may accept a sworn affidavit from a registered architect or engineer stating that the plans submitted conform to the laws as to egress, type of construction and general arrangement and if accompanied by drawings showing the structural design, and by a statement that the plans and design conform to the requirements of this code as to strength, stresses, strains, loads and stability, he may without any examination or inspection accept such affidavit, provided the Architect or Engineer who made such affidavit agrees to submit to the Building Official, on the completion of the structure a certification that the structure has been erected in accordance with the requirements of this code. Where the Building Official relies upon such affidavit, the architect or engineer shall assume full responsibility for the compliance with all provisions of this code and/or other pertinent laws or ordinances.

105.7 — STREET LINES

No permit shall be given by the Building Official for the con-

struction of any building, or for the alteration of any building where said building is to be changed and such change will affect the exterior walls, bays, balconies, or other appendages or projections fronting on any street, alley or public lane, or for the placing on any lot or premises of any building or structure removed from another lot or premises, unless the applicant has made application at the office of the Director of Public Works for the lines of the public street on which he proposes to build, erect or locate said building; and it shall be the duty of the Building Official to see that the street lines are not encroached upon in any manner whatsoever, except as provided for in Chapter XXII.

SECTION 106 — PERMITS

106.1 — ACTION ON APPLICATION

(a) No person, firm or corporation shall erect, construct, enlarge, alter, repair, move, improve, remove, convert or demolish any building or structure in the city, or cause the same to be done, without first obtaining a separate building permit for such buildings or structures from the Building Official.

(b) If the Building Official is satisfied that the work described in an application for permit and the drawings filed therewith conform to the requirements of this code and other pertinent laws and ordinances, he shall issue a permit therefor to the applicant.

(c) If the application for a permit and the drawings filed therewith describe work which does not conform to the requirements of this code or other pertinent laws or ordinances, the Building Official shall not issue a permit, but shall return the drawings to the applicant with his refusal to issue such permit. Such refusal shall, when requested, be in writing and shall contain the reasons therefor.

106.2 — CONTRACTORS LICENSE AND BOND REQUIRED

(a) It shall be the duty of every contractor or builder, who shall make contracts for the erection or construction or repair of buildings for which a permit is required, in the City, and every contractor or builder making such contracts and subletting the same, or any part thereof, to pay a license tax as provided in the general license ordinance, and to register his name in a book provided for that purpose, with the Building Official, giving full name, residence and place of business, and, in case of removal from one place to another in the City to have made corresponding change in said register accordingly; and it shall be the further duty of every such person to give good and sufficient bond in the sum of one thousand dollars ($1,000.00), to be approved by the City Attorney, conditioned to conform to the building regulations, the regulations of this section, and other ordinances of the City in reference to buildings.

106.3 — CONDITIONS OF THE PERMIT

The Building Official shall act upon an application for a permit with plans as filed, or as amended, without unreasonable or unneces-

sary delay. A permit issued shall be construed to be a license to proceed with the work and shall not be construed as authority to violate, cancel, alter, or set aside any of the provisions of this code, nor shall such issuance of a permit prevent the Building Official from thereafter requiring a correction of errors in plans or in construction, or of violations of this code. Any permit issued shall become invalid unless the work authorized by it shall have been commenced within six months after its issuance, or if the work authorized by such permit is suspended or abandoned for a period of one year after the time the work is commenced; provided, that, for cause, one or more extensions of time, for periods not exceeding ninety days each, may be allowed in writing by the Building Official.

106.4 — DRAWINGS TO BE KEPT AT SITE

When the Building Official issues a permit, he shall endorse, in writing, or stamp, both sets of plans "Approved". One set of drawings so approved shall be retained by the Building Official and the other set shall be returned to the applicant. The approved drawings shall be kept at the site of work and shall be open to inspection by the Building Official or his authorized representative.

106.5 — PERMITS ISSUED UPON AFFIDAVITS

Whenever a permit is to be issued in reliance upon an affidavit as provided in Section 105.6 or whenever the work to be covered by a permit involves construction under conditions which, in the opinion of the Building Official, are hazardous or complex, the Building Official shall require that the architect or engineer who signed the affidavit or made the drawings or computations shall supervise such work, be responsible for its conformity with the approved drawings, and forthwith upon its completion make and file with the Building Official written affidavit that the work has been done in conformity with the approved plans and with the structural provisions of the code. In the event such architect or engineer is not available, the owner shall employ in his stead a competent person or agency whose qualifications are approved by the Building Official.

106.6 — FOUNDATION PERMITS

When application for permit to erect or enlarge a building has been filed and pending issuance of such permit, the Building Official may, at his discretion, issue a special permit for the foundations of such building. The holder of such a special permit shall proceed at his own risk and without assurance that a permit for the superstructure will be granted.

SECTION 107 — FEES

107.1 — GENERAL

No permit shall be issued until the fees prescribed in this section shall have been paid. Nor shall an amendment to a permit be approved until the additional fee, if any, due to an increase in the estimated cost of the building or structure, shall have been paid.

107.2 — FAILURE TO OBTAIN A PERMIT

If any person commences any work on a building or structure before obtaining the necessary permit from the city, he shall be subject to the penalty prescribed herein.

107.3 — ACCURATE RECORDS

The Building Official shall keep a permanent and accurate accounting of all permit fees and other monies collected, the names of all persons upon whose account the same was paid, the date and amount thereof.

107.4 — SCHEDULE OF PERMIT FEES

On all buildings, structures or alterations requiring a building permit, as set forth in Section 105, fee shall be paid as required at the time of filing application, in accordance with the following schedule:

(a) Permit Fees

1. Where the valuation does not exceed $100.00, no fee shall be required, unless an inspection is necessary, in which case there shall be a $1.50 fee.

2. For a valuation over $100.00 up to and including $15,000.00 the fee shall be $3.00 per thousand or fraction thereof.

3. For a valuation over $15,000.00 up to and including $100,000.00, the fee shall be $45.00 for the first fifteen thousand plus $2.00 for each additional thousand or fraction thereof.

4. For a valuation over $100,000.00 up to and including $500,000.00, the fee shall be $215.00 for the first one hundred thousand plus $1.00 for each additional thousand or fraction thereof.

5. For a valuation over $500,000.00 up to and including $1,000,000.00, the fee shall be $615.00 for the first five hundred thousand plus 40¢ for each additional thousand or fraction thereof.

6. For a valuation over $1,000,000.00, the fee shall be $815.00 for the first million plus 15¢ for each additional thousand or fraction thereof.

(b) Moving of Building or Structures

1. For the moving of any building or structure, the fee shall be $10.00.

(c) Demolition of Building or Structures

1. For the demolition of any building or structure, the fee shall be $4.00.

107.5 — BUILDING PERMIT VALUATIONS

If, in the opinion of the Building Official, the valuation of building, alteration, or structure appears to be underestimated on the application, permit shall be denied, unless the applicant can show detailed estimated cost to meet the approval of the Building Official. Permit valuations shall include total cost, such as plumbing, electrical, mechanical equipment and other systems.

SECTION 108 — INSPECTIONS

108.1 — INSPECTIONS — GENERAL

(a) Before issuing a permit the Building Official may examine or cause to be examined any building for which an application has been received for permit to enlarge, alter, repair, move, demolish, or change the occupancy thereof. He shall inspect all buildings and structures, from time to time, during and upon completion of the work for which a permit was issued. He shall make a record of every such examination and inspection and of all violations of this code.

(b) When deemed necessary by him, he shall make an inspection of materials or assemblies at the point of manufacture or fabrication. He shall make a record of every such examination and inspection and of all violations of this code.

(c) The Building Official may make, or cause to be made, the inspections called for by these requirements. He may accept reports of inspectors of recognized inspection services provided that after investigation he is satisfied as to their qualifications and reliability. No certificate called for by any provision of these requirements shall be based on such reports unless the same are in writing and certified by a responsible office of such service.

108.2 — INSPECTIONS REQUIRED

(a) The Building Official shall inspect or cause to be inspected at various intervals all construction or work for which a permit is required, and a final inspection shall be made of every building or structure upon completion, prior to the issuance of the Certificate of Occupancy, as required in Section 109.

(b) Work requiring a building permit shall not be commenced until the permit holder or his agent shall have posted the building permit card in a conspicuous place on the front of the premises. The permit shall be protected from the weather and in such position as to permit the Building Official to conveniently make the required entries thereon. This permit card shall be maintained in such position by the permit holder until the Certificate of Occupancy has been issued by the Building Official.

(c) The Building Official upon notification from the permit holder or his agent shall make the following inspections of buildings and such other inspections as may be necessary, and shall either

approve that portion of the construction as completed or shall notify the permit holder or his agent wherein the same fails to comply with the law:

Foundation Inspection: To be made after trenches are excavated and forms erected.

Frame Inspection: To be made after the roof, all framing, fire-blocking and bracing is in place and all pipes, chimneys, and vents are complete.

Final Inspection: To be made after the building is completed and ready for occupancy.

(d) No work shall be done on any part of a building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the Building Official. Such written approval shall be given only after an inspection shall have been made of each successive step in the construction as indicated by each of the foregoing three inspections.

(e) No reinforcing steel or structural frame work of any part of any building or structure shall be covered or concealed in any manner whatsoever without first obtaining the approval of the Building Official, the designing architect or engineer.

(f) In all buildings where plaster is used for fire protection purposes, the permit holder or his agent shall notify the Building Official after all lathing and backing is in place. No plaster shall be applied until the approval of the Building Official has been received (See Chapter X for Fire Resistive Ratings).

SECTION 109 — CERTIFICATE OF OCCUPANCY

109.1 — WHEN REQUIRED

No new building shall be occupied and no change in occupancy of a building or part of a building shall be made until after the Building Official shall have issued a certificate of occupancy therefor.

109.2 — CONTENTS OF CERTIFICATE

Upon completion of a building hereafter erected in accordance with approved plans, and after the final inspection herein referred to, and upon application therefor, the Building Official shall issue a certificate of occupancy stating the nature of the occupancy permitted, the number of persons for each floor when limited by law, the allowable load per square foot for each floor in accordance with the provisions of this code.

109.3 — TEMPORARY OCCUPANCY

A temporary certificate of occupancy may be issued for a portion or portions of a building which may safely be occupied prior to final completion of the building.

109.4 — EXISTING BUILDINGS

A certificate of occupancy for any existing building may be ob-

tained by applying to the Building Official and supplying the information and data necessary to determine compliance with this code for the occupancy intended. Where necessary, in the opinion of the Building Official, two sets of detailed drawings, or a general inspection, or both, may be required. When, upon examination and inspection, it is found that the building conforms to the provisions of this code for such occupancy, a certificate of occupancy shall be issued.

SECTION 110 — POSTING FLOOR LOADS

110.1 — FLOOR LOADS

No existing or new building shall be occupied for any purpose which will cause the floors thereof to be loaded beyond their safe capacity. The Building Official may permit occupancy of a building for mercantile, commercial, or industrial purposes, by a specific business, when he is satisfied that such capacity will not thereby be exceeded.

It shall be the responsibility of the owner, agent, proprietor or occupant of Group F and G Occupancies, or any occupancy where excessive floor loading is likely to occur, to employ a competent architect or engineer in computing the safe load capacity. All such computations shall be accompanied by an affidavit from the architect or engineer stating the safe allowable floor load on each floor in pounds per sq. ft. uniformly distributed; it shall thereupon be filed as a permanent record of the department of building.

110.2 — SIGNS REQUIRED

In every building or part of a building used for business storage, industrial or hazardous purposes, the safe floor loads, as approved by the Building Official, shall be marked on plates of approved design which shall be supplied and securely affixed by the owner of the building in a conspicuous place in each story to which they relate. Such plates shall not be removed or defaced, and if lost, removed or defaced, shall be replaced by the owner of the building.

110.3 — LOADS IN EXCESS OF POSTED CAPACITY

No such owner shall place, or permit to be placed, on any floor of a building a greater load than the safe load so determined and posted.

SECTION 111 — BOARD OF ADJUSTMENTS AND APPEALS

111.1 — APPOINTMENT

There is hereby established in the City a board to be called the Board of Adjustments and Appeals, which shall consist of five (5) members. Such Board shall be composed of one Architect, one General Contractor or Engineer and three Members at large from the

Building Industry. The said Board shall be appointed by the Chief Appointing Authority.

111.2 — TERM OF OFFICE

Of the members first appointed two shall be appointed for a term of one year, two for a term of two years, one for a term of three years, and thereafter they shall be appointed for terms of four years. Vacancies shall be filled for an unexpired term in the manner in which original appointments are required to be made. Continued absence of any member from regular meetings of the Board shall, at the discretion of the Chief Appointing Authority of the municipality, render any such member liable to immediate removal from office.

111.3 — QUORUM

Three members of the board shall constitute a quorum. In varying the application of any provisions of this code or in modifying an order of the Building Official, affirmative votes of the majority present, but not less than three affirmative votes shall be required. No board member shall act in a case in which he has a personal interest.

111.4 — RECORDS

The Building Official shall act as Secretary of the Board of Adjustments and Appeals and shall make a detailed record of all its proceedings, which shall set forth the reasons for its decisions, the vote of each member participating therein, the absence of a member, and any failure of a member to vote.

111.5 — PROCEDURE

The board shall establish rules and regulations for its own procedure not inconsistent with the provisions of this code. The board shall meet at regular intervals, to be determined by the Chairman, or in any event, the board shall meet within ten days after notice of appeal has been received.

SECTION 112 — APPEALS

112.1 — TIME LIMIT

(a) Whenever the Building Official shall reject or refuse to approve the mode or manner of construction proposed to be followed, or materials to be used in the erection or alteration of a building or structure, or when it is claimed that the provisions of this code do not apply, or that an equally good or more desirable form of construction can be employed in any specific case, or when it is claimed that the true intent and meaning of this code or any of the regulations thereunder have been misconstrued or wrongly interpreted, the owner of such building or structure, or his duly authorized agent, may appeal from the decision of the Building Official to the Board

of Adjustments and Appeals. Notice of appeal shall be in writing and filed within 90 days after the decision is rendered by the Building Official. A fee of $10.00 shall accompany such notice of appeal.

(b) In case of a building or structure which, in the opinion of the Building Official, is unsafe or dangerous, the Building Official may, in his order, limit the time for such appeal to a shorter period. Appeals hereunder shall be on forms provided by the Building Official.

SECTION 113 — DECISIONS OF THE BOARD OF ADJUSTMENTS AND APPEALS

113.1 — VARIATIONS AND MODIFICATIONS

(a) The Board of Adjustments and Appeals, when so appealed to and after a hearing, may vary the application of any provision of this code to any particular case when, in its opinion, the enforcement thereof would do manifest injustice, and would be contrary to the spirit and purpose of this code or public interest, or when, in its opinion the interpretation of the Building Official should be modified or reversed.

(b) A decision of the Board of Adjustments and Appeals to vary the application of any provision of this code or to modify an order of the Building Official shall specify in what manner such variation or modification is made, the conditions upon which it is made and the reasons therefor.

113.2 — DECISIONS

(a) Every decision of the Board of Adjustments and Appeals shall be final, subject, however, to such remedy as any aggrieved party might have at law or in equity. It shall be in writing and shall indicate the vote upon the decision. Every decision shall be promptly filed in the office of the Building Official, and shall be open to public inspection; a certified copy shall be sent by mail or otherwise to the apellant and a copy shall be kept publicly posted in the office of the Building Official for two weeks after filing.

(b) The Board of Adjustments and Appeals shall, in every case, reach a decision without unreasonable or unnecessary delay.

(c) If a decision of the Board of Adjustments and Appeals reverses or modifies a refusal, order, or disallowance of the Building Official, or varies the application of any provision of this code, the Building Official shall immediately take action in accordance with such decision.

SECTION 114 — VIOLATIONS AND PENALTIES

Any person, firm, corporation or agent who shall violate a provision of this code, or fail to comply therewith, or with any of the requirements thereof, or who shall erect, construct, alter, demolish

or move any structure, or has erected, constructed, altered, repaired, moved or demolished a building or structure in violation of a detailed statement or drawing submitted and approved thereunder, shall be guilty of a misdemeanor. Each such person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any violation of any of the provisions of this code is committed, or continued and upon conviction of any such violation such person shall be punished within the limits and as provided by State Laws.

SECTION 115 — VALIDITY

If any section, sub-section, sentence, clause or phrase of this Ordinance is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this Code.

CHAPTER II—DEFINITIONS

SECTION 201 — DEFINITIONS

201.1

For the purpose of this Code, certain abbreviations, terms, phrases, words, and their derivatives, shall be construed as set forth in this Section.

201.2

Words used in the present tense include the future. Words in the masculine gender include the feminine and neuter. Words in the feminine and neuter gender include the masculine. The singular number includes the plural and the plural number includes the singular.

ALLEY—means any public space or thoroughfare twenty (20) feet or less in width which has been dedicated or deeded for public use.

ALTER OR ALTERATION—means any change or modification in construction or occupancy.

AMUSEMENT DEVICE—means a mechanically operated device which is used to convey persons in any direction as a form of amusement.

APARTMENT—means a room or a suite of rooms occupied, or which is intended or designed to be occupied, as the home or residence of one individual, family or household, for housekeeping purposes.

APARTMENT HOUSE—means any building, or portion thereof, which is designed, built, rented, leased, let or hired out to be occupied, or which is occupied as the home or residence of more than two (2) families living independently of each other and doing their own cooking in the said building, and shall include flats and apartments.

APPROVED—means approved by the Building Official.

ARCHITECT—within the meaning of this Code, shall be deemed to be a duly registered and licensed architect.

AREA—as applied to the dimensions of a building, means the maximum horizontal projected area of the building at grade.

AREA—(See FLOOR AREA).

A. S. A.—means American Standards Association.

A. S. T. M.—means American Society for Testing Materials.

ASSEMBLY OCCUPANCY—(Defined in Section 408.1).

ATTIC STORY—means any story situated wholly or partly in the roof, so designated, arranged or built as to be used for business, storage or habitation.

AUTOMATIC—as applied to a fire door or other opening protective, means normally held in open position and automatically closed by a releasing device actuated by abnormal high temperature, or by a pre-determined rate of rise in temperature.

BALCONY—means that portion of the seating space of an assembly room, the lowest part of which is raised four (4) feet or more above level of the main floor.

BASEMENT—means that portion of a building between floor and ceiling, which is partly below and partly above grade (as defined in this Section), but so located that the vertical distance from grade to the floor below is less than the vertical distance from grade to ceiling, provided, however, that the distance from grade to ceiling shall be at least four (4) feet six (6) inches. (See STORY).

BEAM—a primary structural member supporting secondary structural members, floor, roof, joists, and the like.

BUILDING—means any structure built for the support, shelter or enclosure of persons, animals, chattels, or property of any kind which has enclosing walls for 50% of its perimeter. The term "building" shall be construed as if followed by the words "or part thereof". (For the purpose of this Code each portion of a building separated from other portions by a fire wall shall be considered as a separate building).

SHED—means any structure built for the support, shelter or enclosure of persons, animals, chattels, or property of any kind which has enclosing walls for less than 50% of its perimeter.

OPEN SHED—means any structure that has no enclosing walls.

EXISTING BUILDING—means a building erected prior to the adoption of this Code, or one for which a legal building permit has been issued.

BUILDING LINE—means the line, established by law, beyond which a building shall not extend, except as specifically provided by law.

BUILDING OFFICIAL—means the officer, or other person, charged with the administration and enforcement of this ordinance, or his duly authorized representative.

BUSINESS OCCUPANCY—(Defined in Section 405.1).

CAST STONE—is a building stone manufactured from cement concrete precast and used as a trim, veneer or facing on or in buildings or structures.

CELLAR—means that portion of a building, the ceiling of which is entirely below grade or less than four (4) feet six (6) inches above grade. (See STORY.)

CITY—means the municipal corporation which has adopted this Code.

COMBUSTIBLE MATERIAL—means an inflammable material which will ignite at or below a temperature of 1200° F. and continue to burn or glow.

COMMON-PROPERTY LINE—means a line dividing one lot from another when said lots are not of one ownership.

COMPLIANCE APPROVAL—means approval as being in compliance with the provisions of the Southern Standard Building Code

as analyzed by the Committee on Compliance of the Southern Building Code Congress.

CONCRETE—all definitions in Section 1601.4.

CURB LEVEL—referring to a building, means the elevation at that point of the street grade that is opposite the center of the wall nearest to and facing the street line.

DEAD LOAD—(See Section 1202.)

DISPLAY SIGN—means a structure that is arranged, intended, designed or used as an advertisement announcement or direction, and includes a sign, sign screen, billboard and advertising devices of every kind.

DWELLING—when used in this Code without other qualifications, means a structure occupied exclusively for residential purpose by not more than two families.

ENGINEER—within the meaning of this Code, shall be deemed to be a duly registered and licensed engineer.

EXISTING BUILDING—(See BUILDING—EXISTING BUILDING).

EXIT CORRIDOR—means any corridor or passageway used as an integral part of the exit system. That portion of a corridor or passageway which exceeds the allowable distance of travel to an exit, (Section 1103) becomes an exit corridor or passageway.

EXIT PASSAGEWAY—means an enclosed hallway or corridor connecting a required exit to a street.

FAMILY—means one or more persons living together, whether related to each other by birth or not, and having common housekeeping facilities.

FILLING STATION—(Defined in Section 505).

FIRE DOOR—means a door and its assembly, so constructed and assembled in place as to give the specified protection against the passage of fire.

FIRE LIMITS—(See Section 301).

FIRE PARTITION—means a partition of construction which subdivides a building to restrict the spread of fire or to provide areas of refuge, but is not necessarily continuous through all stories nor extended through the roof, and which has a fire-resistance rating as required by the Code.

FIREPROOF CONSTRUCTION—(Defined in Section 602).

FIRE-RESISTANCE RATING—means the time in hours that the material or construction will withstand the standard fire exposure as determined by a fire test made in conformity with the "Standard Methods of Fire Tests of Building Construction and Materials" of the American Society for Testing Materials (ASTM Designation E119-55).

FIRE-RESISTIVE CONSTRUCTION—(Defined in Section 603).

FIRE WALL—(See Walls).

FLOOR AREA—means the area included within surounding

walls of a building exclusive of vent shafts and courts.

FRONT OF LOT—means the front boundary line of a lot bordering on the street, and in the case of a corner lot, may be either frontage.

GALLERY—means that portion of the seating space of an assembly room having a seating capacity of more than ten (10) located above a balcony.

GARAGE—

PRIVATE GARAGE—(Defined in Section 506).

PUBLIC GARAGE—means any garage other than a private garage.

GRADE—with reference to a building means, when the curb level has been established, the main elevation of the curb level opposite those walls that are located on, or parallel with and within fifteen (15) feet of, street lines; or, when the curb level has not been established, or all the walls of the building are more than fifteen (15) feet from street lines, GRADE means the average of the finished ground level at the center of all walls of a building.

GRADE—with reference to lumber, means the division of sawn lumber into quality classes with respect to its physical and mechanical properties as defined in published lumber manufacturers' standard grading rules.

HABITABLE ROOM—means a room occupied by one or more persons for living, eating, sleeping, or working purposes. It does not include toilets, laundries, serving and storage pantries, corridors, cellars, and spaces that are not used frequently or during extended periods.

HEATING—(All definitions in Chapter VIII).

HEAVY TIMBER CONSTRUCTION—(Defined in Section 604).

HEIGHT—as applied to a building, means the vertical distance from grade to the highest finished roof surface in the case of flat roofs or to a point at the average height of roofs having a pitch of more than one (1) foot in four and one-half (4½) feet; HEIGHT of a building in stories does not include basements and cellars, except as specifically provided otherwise.

HEIGHT—as applied to a story, means the vertical distance from top to top of two successive finished floor surfaces.

HEIGHT—as applied to a wall, means the vertical distance to the top measured from the foundation wall, or from a girder or other immediate support of such wall.

INCOMBUSTIBLE MATERIAL—is synonymous with NON-COMBUSTIBLE MATERIAL.

INDUSTRIAL OCCUPANCY—(Defined in Section 410.1).

INNER COURT—an open unoccupied space bounded by the walls of the building, but located within the exterior walls of the building.

INSTITUTIONAL OCCUPANCY—(Defined in Section 407.1).

INTERIOR LOT LINE—is synonymous with COMMON-PROPERTY LINE.

LINTEL—means the beam or girder placed over an opening in a wall which supports the wall construction above.

LIVE LOAD—(See Section 1203).

LOT—a parcel of land considered as a unit.

MASONRY—means that form of construction, composed of stone, brick, concrete, gypsum, hollow clay tile, concrete block or tile, or other similar building units or materials or a combination of these materials laid up unit by unit and set in mortar. For the purpose of this Code, plain monolithic concrete shall be considered as Masonry. (See Section 1402.6).

SOLID MASONRY—means masonry built without hollow spaces.

MEZZANINE OR MEZZANINE FLOOR—means an intermediate floor placed in any story or room. When the total area of any "MEZZANINE FLOOR" exceeds thirty three and one-third (33⅓) percent of the total floor area in that room, it shall be considered as consituting an additional "story." The floor height above or below a "MEZZANINE FLOOR" construction shall be not less than seven (7) feet.

MIXED TYPES OF CONSTRUCTION—has the meaning as set forth in Section 609 of this Code.

MULTIPLE DWELLING—has the same meaning as APARTMENT HOUSE.

NON-COMBUSTIBLE MATERIAL—means a non-inflammable material which will not ignite at or below a temperature of 1200° F. and will not continue to burn or glow at that temperature.

NON-COMBUSTIBLE CONSTRUCTION—(Defined in Section 605.1).

OCCUPANCY—means the purpose for which a building is used or intended to be used. Change of occupancy is not intended to include change of tenants or proprietors.

MIXED OCCUPANCY—means mixed occupancy as set forth in Section 412 of this Code.

SPECIAL OCCUPANCY—means Group H Occupancy, as set forth in Section 411 of this Code.

ORDINARY CONSTRUCTION—(Defined in Section 606).

OWNER—includes his duly authorized agent or attorney, a purchaser, devisee, fiduciary, and a person having a vested or contingent interest in the property in question.

PENTHOUSE—means an enclosed structure other than a roof structure, located on the roof, extending not more than twelve (12) feet above a roof.

PERSON—means a natural person, his heirs, executors, administrators, or assign, and also includes a firm, partnership, or corporation, its or their successors or assigns, or the agent of any of the aforesaid.

PUBLIC PARKING DECKS—means a special structure limited in use only to the temporary parking of motor vehicles.

PUBLIC PLACE—as used in this Code, means an unoccupied open space adjoining a building and on the same property, that is permanently maintained accessible to the Fire Department and free of all incumbrances that might interfere with its use by the Fire Department.

REPAIR—means the replacement of existing work with the same kind of material used in the existing work, not including additional work that would change the structural safety of the building, or that would affect or change required exit facilities, a vital element of an elevator, plumbing, gas piping, wiring or heating installations, or that would be in violation of a provision of law or ordinance. The term "Repair" or "Repairs" shall not apply to any change of construction.

REQUIRED—means required by some provision of this Code.

RESIDENTIAL OCCUPANCY—(Defined in Section 404.1).

ROOF STRUCTURE—means a structure above a roof or any part of a building enclosing a stairway, tank, elevator machinery or ventilating apparatus, or such part of a shaft as extends above the roof.

ROOM CAPACITY—(See Section 1105.1).

SCHOOL OCCUPANCY—(Defined in Section 406.1).

SEATING CAPACITY—(See Section 408.3).

SELF-CLOSING—as applied to a fire door or other opening protective, means normally closed and equipped with an approved device which will insure closing after having been opened for use.

SHAFT—means a vertical opening extending through one or more stories of a building, for elevators, dumbwaiter, light, ventilation, or similar purpose.

SHALL—as used in this Code, is mandatory.

SIGNS—(See Chapter XXIII).

SPECIAL OCCUPANCY—(Defined in Section 411.1).

SPRINKLERED—means equipped with an approved automatic sprinkler system properly maintained.

STAGE—GENERAL—a stage is a partially enclosed portion of an Assembly Building, cut off from the audience section by a proscenium wall, which is designed or used for the presentation of plays, demonstrations, or other entertainment. "Stages" shall be classified as "working stage" and "non-working stage".

STAGE—WORKING—(Also Theatrical Stage — See Section 512.19) — a working stage is a partially enclosed portion of an Assembly Building, cut off from the audience section by a proscenium wall of masonry of not less than 4 hour fire-resistance construction, and which is equipped with scenery loft, gridiron, fly-gallery, and lighting equipment, and the proscenium opening shall be equipped with a fire-proof and smoke-proof curtain, and the depth from the proscenium curtain to the back wall shall be not less than fifteen (15) feet.

STAGE—NON-WORKING—a non-working stage is a partially enclosed portion of an Assembly Building, cut off from the audience section by a proscenium wall of not less than one-hour fire-resistive construction, without the equipment common to the Working Stage (such as fly gallery and gridiron) and of such dimensions that such equipment cannot be installed (but flat scenery may be used on such stage).

A fireproof curtain is not required for a non-working stage, but if there is a fabric or other curtain it shall be of incombustible materials or treated with an approved fire retardant. The depth of the stage may be more or less than fifteen (15) feet.

PLATFORM—a platform is a raised section of floor within the assembly hall or auditorium area, and setting on the floor thereof, not enclosed above the platform floor level, and usually or relatively small area as compared to the auditorium seating area. A platform may be of permanent, temporary, or portable construction; it may have "flat" movable scenery and draw curtains.

ROSTRUM—(See "platform"). Usually used for single or small group of persons such as lecturers, no scenery or curtains. May be permanent, temporary, or portable.

DAIS—a small and low "platform" or "rostrum", may be placed on a "stage". May be permanent, temporary, or portable.

PODIUM—a small "dais" of size sufficient to accommodate one or two persons, such as a band or orchestra conductor or a soloist. A "podium" may be located on a Stage, Platform, Rostrum, or Dais, or the floor of the audience section of a place of assembly. A podium is almost always a portable construction.

STAIRWAY—means one or more flights of stairs and the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one story to another in a building or structure.

STANDARD FIRE TEST—means the fire test formulated under the procedure of the American Standards Association as "American Standard." This "American Standard" is the "Standard Methods of Fire Tests of Building Construction and Materials" of the American Society for Testing Materials (ASTM Designation E119-55).

STORY—means that portion of a building included between the upper surface of any floor and the upper surface of the floor next above, except that the topmost story shall be that portion of a building included between the upper surface of the topmost floor and the ceiling or roof above. (For basement of schools see Section 402.5).

STREET—means any public thoroughfare (street, avenue, boulevard, park) or space more than twenty (20) feet in width which has been dedicated or deeded to the public for public use.

STREET LINE—means a lot line dividing a lot from a street.

STRUCTURE—means that which is built or constructed, an edifice or building of any kind, or any piece of work artifically built up or composed of parts joined together in some definite manner. The

term "structure" shall be construed as if followed by the words "or part therof."

SURVEYOR—within the meaning of this Code, shall be deemed to be duly registered and licensed surveyor or Civil Engineer.

THEATER—means a building, or part thereof, which contains an assembly hall with or without stage which may be equipped with curtains and permanent stage scenery or mechanical equipment adaptable to the showing of plays, operas, motion pictures, performances, spectacles and similar forms of entertainment. (See Section 408.)

VALUATION OR VALUE—as applied to a building, means the estimated cost to replace the building in kind.

VENEER—means a facing of brick, concrete, metal, stone, tile or similar material attached to a wall for the purpose of providing ornamentation, protection, or insulation, but not counted as adding strength to the wall.

WALLS—

BEARING WALLS—means a wall which supports any vertical load in addition to its own weight.

CAVITY WALL—means a wall built of masonry units or of plain concrete, or a combination of these materials, so arranged as to provide an air space within the wall, and in which the inner and outer parts of the wall are tied together with metal ties.

CURTAIN WALL—means a non-bearing wall between columns or piers and which is not supported by girders or beams, but is supported on the ground.

FACED WALL—means a wall in which the masonry facing and backing are so bonded as to exert common action under load.

EXTERIOR WALL—means a wall, bearing or non-bearing, which is used as an enclosing wall for a building, but which is not necessarily suitable for use as a Party Wall or Fire Wall.

FIRE PARTITION—(See definition under "F".)

FIRE WALL—means a wall of incombustible construction which subdivides a building or separates buildings to restrict the spread of fire and which starts at the foundation and extends continuously through all stories to and above the roof, except where the roof is of fireproof or fire-resistive construction and the wall is carried up tightly against the underside of the roof slab.

FOUNDATION WALL—means a wall below the first floor extending below the adjacent ground level and serving as support for a wall, pier, column or other structural part of a building.

HOLLOW WALL OF MASONRY—means a wall built of masonry units so arranged as to provide an air space within the wall, and in which the inner and outer parts of the wall are bonded together with masonry units or steel.

NON-BEARING WALL—means a wall which supports no load other than its own weight.

PANEL WALL—means a non-bearing wall in skeleton or framed construction, built between columns or piers and wholly supported at each story.

PARAPET WALL—means that part of any wall entirely above the roof line.

PARTY WALL—means a wall used or adapted for joint service between two (2) buildings.

RETAINING WALL—means any wall used to resist the lateral displacement of any material.

WOOD FRAME CONSTRUCTION—(Defined in Section 607).

WRITING—includes printing and typewriting.

WRITTEN NOTICE—shall be considered to have been served if delivered in person to the individual, or to the parties intended, or if delivered at, or sent by registered mail to, the last business address of the party given the notice.

CHAPTER III

FIRE DISTRICTS

SECTION 301 — GENERAL BUILDING RESTRICTIONS— WITHIN FIRE DISTRICTS

301.1 — GENERAL

For the purpose of this Code there shall be established two fire districts or zones, which shall be known as the first and second Fire Districts.

301.2 — TYPES OF CONSTRUCTION PERMITTED

Within the first and second fire districts every building hereafter erected shall be one of the following types except temporary structures as provided in Section 504 and one and two family dwellings which may be erected of type VI wood frame construction in the second fire district only:

Type I—Fireproof.
Type II—Fire-Resistive.
Type III—Heavy Timber.
Type IV—Non-Combustible Frame.
Type V—Ordinary.

301.3 — OTHER SPECIFIC REQUIREMENTS

(a) Exterior Walls

Exterior walls of buildings located in First Fire District shall comply with the requirements specified in Chapter VI, except as set forth in Section 610.

(b) Group "H" Special Hazardous Not Permitted

Every Group "H" occupancy shall be prohibited from location within the First Fire District.

(c) Fire Protection

Every building shall be fire protected throughout as specified for the various types of construction, Chapter VI.

(d) Roof Coverings

Roof coverings in the fire districts shall conform to the requirements for class 1 or 2 roof coverings, as defined in section 706, except that Class 3 Roof Covering may be permitted on one and two family wood frame dwellings in Fire District No. 2.

(e) Interior Fire Protection—First Fire District

In buildings over one story in height (unless of Type III Heavy Timber construction or sprinklered) all walls, floors, roofs and their supporting structural members shall provide not less than one (1) hour fire-resistance. (Temporary partitions are set forth in Section 702.2.)

301.4 — SCOPE

Each Fire District shall include such territory or portion of the city as outlined in an ordinance of said city entitled, "An Ordinance Creating and Establishing Fire Districts." Whenever, in such ordinance creating and establishing Fire Districts, reference is made to any Fire District, it shall be construed to mean one of the Fire Districts designated and referred to in this Chapter.

SECTION 302 — CHANGES TO BUILDINGS

302.1 — EXISTING BUILDINGS

Within the First and Second Fire Districts no existing building shall be hereafter increased in height unless it is of a type of construction permitted for new buildings within such Fire Districts, or is altered to comply with the requirements for such type of construction; nor shall any existing building be hereafter extended on any side, unless such extensions are of a type of construction permitted for new buildings within such Fire Districts.

302.2 — ALTERATIONS — GENERAL

Nothing in this section, however, shall prohibit other alterations within the Fire Districts, provided there is no change of occupancy that is otherwise prohibited and provided the fire hazard is not increased by such alterations.

302.3 — MOVING BUILDINGS

No building shall hereafter be moved from one Fire District into another or to another lot in the same District unless its type of construction is permitted in the District into, or within, which it is to be moved. (See Section 2204 — Regulations for Moving Buildings).

SECTION 303 — BUILDINGS LOCATED IN TWO DISTRICTS

Any building located in more than one Fire District shall be of a type of construction required for the most highly restricted District unless the major part of such building lies outside of such District, and no part is more than ten (10) feet inside the boundaries of such district.

SECTION 304 — EXCEPTIONS TO RESTRICTIONS IN FIRE DISTRICTS

304.1 — FIRST FIRE DISTRICT

The preceding provisions of this chapter shall not apply to temporary buildings used in connection with duly authorized construction, nor to water tanks or cooling towers conforming to Sections 713 and 714, nor to display signs conforming to Chapter XXIII.

304.2 — SECOND FIRE DISTRICT

The exceptions in the Second Fire District shall be as follows:

1. A private garage used exclusively as such, not more than one story in height, nor more than six hundred and fifty (650) sq. ft. in area located on the same lot with a dwelling.

2. Fences not over eight (8) feet in height.

3. Coal tipples, material bins, trestles conforming to Section 503.

4. Water tanks and cooling towers conforming to Sections 713 and 714.

5. Greenhouses less than fifteen (15) feet high.

6. Porches on dwellings, not over one story in height and not over ten (10) feet wide from the face of the building, provided such porch does not come within 5 feet of any property line.

7. Display signs as provided in Chapter XXIII.

8. Sheds, open on a long side, not over 15 feet high or 500 square feet in area.

304.3 — OUTSIDE OF FIRE DISTRICT

Outside the First and Second Fire Districts all types of construction are permitted provided they comply with the provisions prescribed elsewhere in this code that apply regardless of location. Roof coverings shall conform to the requirements as defined in Section 706.

CHAPTER IV

CLASSIFICATION OF BUILDING BY OCCUPANCY

SECTION 401 — CLASSIFICATION BY OCCUPANCY OR USE

401.1 — GENERAL

Every new and existing building, or part thereof shall, for the purpose of this Code, be classified according to its use or occupancy as a building of one of the following OCCUPANCY GROUPS:

GROUP A—RESIDENTIAL

GROUP B—BUSINESS

GROUP C—SCHOOL

GROUP D—INSTITUTIONAL

GROUP E—ASSEMBLY

GROUP F—STORAGE

GROUP G—INDUSTRIAL

GROUP H—HAZARDOUS

Each occupancy group is intended to embrace buildings as hereinafter defined and those of similar character or use. Wherever there is any uncertainty as to the classification of a building, the Building Official shall fix the classification within which it falls, according to the relative fire hazard involved.

SECTION 402 — HEIGHT AND AREA RESTRICTIONS

402.1 — APPLICATION

In the protection of each occupancy, the maximum height and area for buildings of the different types of construction, shall be governed by the intended use of the buildings, or occupancy, as provided for in this Chapter.

402.2 — DEFINITIONS

For the purpose of this Code, "height" and "area," as applied to a building, has the meaning designated in Chapter II, Definitions.

402.3 — EXCEPTIONS — HEIGHT

Church spires, chimneys, tanks and supports, aerial supports, parapet walls not over four (4) feet high, bulkheads and penthouses used solely to enclose stairways, tanks, elevator machinery or shafts, or ventilation or air-conditioning apparatus, need not be considered in determining the highest point of the building; provided that the highest point shall be taken to be the highest point of the roof of the highest penthouse when the aggregate area of all penthouses and other roof structures exceeds twenty (20) percent of the area of the roof upon which they stand. (See requirements of Section 712 and 713).

402.4 — MEZZANINES

Mezzanine floors or galleries shall not be regarded as a story unless they exceed thirty-three and one-third (33⅓) percent of the aggregate ground floor area.

402.5 — LIMITATIONS, HEIGHT

(a) The basement or cellar of a building shall not count as a story if the first floor above such basement or cellar is less than seven (7) feet above grade.

SECTION 403 — EXCEPTIONS TO AREA RESTRICTIONS

403.1 — GENERAL

The exceptions and requirements of this Section shall modify the area limits of this Chapter, as herein provided.

403.2 — AREA INCREASES NOT PERMITTED (WITH EXCEPTION)

The increase of floor areas permitted by this Section may be additive when applicable, except that in buildings where, because of occupancy, type construction or fire districts, one-hour fire-resistive construction is a requirement, or automatic sprinkler equipment is required, as specified in Section 901, no increase of area shall be permitted because of such construction or equipment.

403.3 — EXCEPTIONS — AREA — FIRE DIVISION WALLS

(a) General

For the purpose of this Code, each part of a building included within fire walls shall be deemed to be a separate building.

(b) New Buildings

No building shall be limited in area when divided into sections by fire walls having not less than four hour fire-resistive ratings, as specified in Chapter VI, provided no section exceeds the maximum allowable floor area in this Chapter.

(c) Existing Buildings

No building hereafter erected shall be extended to exceed the maximum floor area set forth in this chapter, governed by the occupancy and type of construction. However, a building heretofore lawfully erected, which already exceeds such maximum area, may be extended, provided such extension does not exceed the maximum area prescribed and provided such extension is separated from the existing building by a fire wall having a fire-resistive rating of not less than four hours.

403.4 — AREA INCREASE FOR ONE-HOUR FIRE-RESISTANCE

Except in buildings where the occupancy or conditions are such that one-hour fire-resistance is a requirement of this Code, buildings of Type IV Non-Combustible, Type V Ordinary and Type VI Wood Frame Constructions, interiors of which are provided throughout with not less than one-hour fire-resistive construction may have the maximum allowable areas of this Chapter increased fifty (50) percent.

403.5 — AREA INCREASE FOR SEPARATION ON TWO OR MORE SIDES OF A BUILDING

Where streets or public places of minimum width not less than 20 feet extend along two or more sides of a building, the maximum areas specified in this Chapter and modified as provided in this Section; such buildings may be increased by the percentage specified in Table 403.5 for each foot by which the minimum width of such streets or public places exceed 20 feet, but such increase shall not exceed the maximum percentage shown in Table 403.5.

TABLE 403.5 — RATE OF AREA INCREASE FOR SEPARATION

	Rate for Areas Increase for Separation Over 20' Wide	Max. Area Increase
Separation along 2 sides but along not less than 50% of perimeter of building	1% per Ft. over 20 Ft.	50%
Separation along 3 sides but along not less than 75% of perimeter of building	2% per Ft. over 20 Ft.	100%

Separation along all sides or along 100% of perimeter of building	3% per Ft. over 20 Ft.	100%

403.6 — AREA INCREASE FOR SPRINKLERS

The maximum allowable floor areas specified in this Chapter and modified as provided in this Section, may be doubled if the building is provided with approved automatic sprinklers throughout in accordance with Section 901 of Chapter IX, except that such increase shall not be permitted in buildings where conditions are such that sprinkler equipment is a requirement of this Code, or, except that such increase in area shall not be permitted in buildings of such height that the installation of approved automatic sprinkler equipment is a mandatory requirement of this Code under the regulations prescribed in Section 404 to Section 411 herein, or, where in the opinion of the Building Official, for the nature of the hazard involved is such that sprinkler equipment does not reduce the fire hazard sufficiently to warrant such increase of area.

403.7 — UNLIMITED AREAS

The area of a one-story building of Group B Business, Group F Storage, or Group G Industrial occupancy, located outside the First and Second Fire Districts, shall not be limited provided the building is equipped with approved automatic sprinklers, or other fire protective systems, throughout, in accordance with Section 901 and as approved by the Building Official, and is surrounded on all sides by a permanent open space of not less than sixty (60) feet. Where, in the opinion of the Board of Adjustments and Appeals, in Group F Storage or Group G Industrial occupancies, an automatic water sprinkler system would be inconsistent with the use of the building, it may be omitted.

SECTION 404 — GROUP "A" — RESIDENTIAL

404.1 — SCOPE

Buildings in which families or households live or in which sleeping accommodations are provided, and all dormitories, shall be classified as Group A—Residential Occupancy. Group A—Residential Occupancy—shall include, among others, the following:

Dwellings

Multiple Dwellings (more than two families)

Hotels

Dormitories

Lodging Houses

Convents

Monasteries

404.2 — PROTECTIVE REQUIREMENTS — GROUP "A" OCCUPANCY

	SECTION
1. Allowable Height and Area	404.4
2. Type of Construction	601 to 609, inclusive
3. Exit Requirements	1101 to 1119, inclusive
4. Protection of Vertical Openings	701 to 701.4, inclusive
5. Protection of Wall Openings	703 to 703.7, inclusive
6. Sprinklers and Standpipes	901 to 902, inclusive
7. Mixed Occupancy Separations	412
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII

404.3 — SPECIAL REQUIREMENTS, GROUP "A" OCCUPANCY

1. Separation of Furnace or Boiler Rooms ..... Section 801.2
2. Storage and handling of flammable liquids shall be prohibited in every Group "A" Occupancy. Not more than one (1) gallon of flammable liquid, used for cleaning purposes only, may be kept in a residence, provided such flammable liquid is kept in an approved container, used especially for that purpose.

404.4 — GROUP "A" RESIDENTIAL OCCUPANCY—HEIGHT AND AREA RESTRICTIONS

	ALLOWABLE HEIGHTS Type Construction Used	ALLOWABLE AREAS Area Per Floor (Sq. Ft.)		
	Story Height	One Story	Two Stories	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire-Resistive	80 ft.	No Limit	No Limit	No Limit
Type III — Heavy Timber	Three	14,000	12,000	8,000
Type IV — Non-Combustible	Five*	12,000	10,000	6,500
Type V — Ordinary	Five*	12,000	10,000	6,400
Type VI — Wood Frame	Two & one-half	7,000	7,000	4,000**

*When over 4 stories in height, two-hour fire-resistive floors shall be required over basement or cellar.

**For one and two-family dwellings only. See Section 403 for Area Modifications.

SECTION 405 — GROUP "B" — BUSINESS

405.1 — SCOPE

Buildings which are occupied for business or rendering of professional services shall be classified in Group B-1; buildings which are occupied for the sale or display of merchandise, or the supplying of food or drink, shall be classified in Group B-2.

Group B—Business Occupancy includes, among others, the occupancies listed below, but does not include buildings used for any purpose involving highly combustible, inflammable or explosive materials.

Group B-1—Office buildings, greenhouses, filling stations, banks, undertaking parlors, temporary structures.

Group B-2—Stores, shops, markets, restaurants (See exception in Section 405.2).

405.2 — EXCEPTION

Restaurants or places supplying food or drink that accommodate 75 or more people, or that have a stage, or that provide dancing or entertainment features, shall be classified in Group E—Assembly and not in Group B — Business Occupancy (See Section 408).

405.3 — PROTECTIVE REQUIREMENTS—GROUP "B" OCCUPANCY

	SECTION
1. Allowable Height and Area	405.5
Heights and Areas are based upon type of construction used.	
2. Type of Construction	601 to 609, inclusive
3. Exit Requirements	1101 to 1119, inclusive
4. Protection of Vertical Openings	701 to 701.4, inclusive
5. Protection of Wall Openings	703 to 703.7, inclusive
6. Sprinklers and Standpipes	901 to 902, inclusive
7. Mixed Occupancy Separations	412
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII

405.4 — SPECIAL REQUIREMENTS—GROUP "B" OCCUPANCY

	SECTION
1. Separation of Boiler or Furnace Rooms	801.2
2. Special Exit Doorway Requirements	1110
3. Temporary Structures	504
4. Filling Stations	505
5. Greenhouses	509
6. Ratproof Construction Requirements	Chapter XIX

7. Storage and handling of flammable liquids shall be prohibited; except in Group B-2 (retail stores) that are not in excess of Section 411.2 (b); except filling stations which shall conform to Section 501.1 (f).

405.5 — GROUP "B" BUSINESS OCCUPANCY — HEIGHT AND AREA RESTRICTIONS

Type Construction	ALLOWABLE HEIGHTS Story Height	ALLOWABLE AREAS Area Per Floor (Sq. Ft.) One Story	Two Story	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire-Resistive	80 ft. (a)	No Limit	No Limit	No Limit
Type III — Heavy Timber				
B-1—Offices, etc.	Five	20,500	16,000	13,500
B-2—Mercantile	Five	12,000	10,000	8,000
Type IV — Non-Combustible*				
B-1—Offices, etc.	Five	17,000	12,000	6,000
B-2—Mercantile	Five	9,000	8,000	4,000
Type V — Ordinary*				
B-1—Offices, etc.	Five	14,000	11,000	6,000
B-2—Mercantile	Five	9,000	8,000	4,000
Type VI — Wood Frame				
B-1—Offices, etc.	Two	9,000	7,000	Not Permitted
B-2—Mercantile	Two	6,000	4,000	Not Permitted

*When more than four stories in height two-hour fire-resistive floors shall be constructed over basement or cellar.

Note: For allowable increase in areas for additional protection, see Section 403.

(a) The height of Type II Fire-Resistive construction for buildings of Group "B" Business Occupancies shall not be limited provided the fire-resistance of all columns shall be not less than 3 hours, and of the other structural members, including floors, shall be not less than that shown in Table 603.5, but in no case less than 2 hours, except that roofs shall be of not less than 1½-hour fire-resistive construction.

SECTION 406 — GROUP "C" — SCHOOLS

406.1 — SCOPE

Buildings in which people come together for education or instructional purposes shall be classified in Group "C" — School Occupancy.

Group C — School Occupancy shall include, among others, the following:

Schools	Universities
Colleges	Academies

406.2 — EXCEPTION

Parts of buildings used for the congregating or gathering of 75 or more persons in one room shall be classified as in Group E — Assembly Occupancy—(see Section 408), regardless of whether such gathering is of an educational or instructional nature or not.

Schools for business or vocational training shall be classified in the same occupancies and conform to the same requirements as the trade, vocation or business taught.

406.3 — PROTECTIVE REQUIREMENTS, GROUP "C" OCCUPANCY

	SECTION
1. Allowable Height and Area	406.5
Heights and Areas are based upon type of construction used.	
2. Types of Construction	601 to 609, inclusive
3. Exit Requirements	1101 to 1119, inclusive
4. Protection of Vertical Openings	701 to 701.4, inclusive
5. Protection of Wall Openings	703 to 703.7, inclusive
6. Sprinklers and Standpipes	901 to 902, inclusive
7. Mixed Occupancy Separations	412
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII

406.4 — SPECIAL REQUIREMENTS, GROUP "C" OCCUPANCY

	SECTION
1. Separation of Boiler or Furnace Rooms	801.2
2. Non-combustible Stairways Required	1108
3. Corridors	1111
4. Not less than Unilateral Light shall be required	2001.5

5. No classroom shall occupy basement room fifty (50) percent below ground level.
6. Every heating appliance which produces an unprotected open flame shall be prohibited.
7. Storage and handling of flammable liquids shall be prohibited.
8. Where permanent motion picture projectors are used, booths shall be provided, as set forth in Section 512.25.
9. **Small children shall be on first floor.**
   In buildings of other than Type I and II construction, children below the fifth grade shall not occupy any classroom above the first floor. The lower grades shall be located in the classrooms nearest the exits.

406.5 — GROUP "C" SCHOOL OCCUPANCY — HEIGHT AND AREA RESTRICTIONS

	ALLOWABLE HEIGHTS Type Construction Used**	ALLOWABLE AREAS Area Per Floor (Sq. Ft.)		
	Story Height	One Story	Two Stories	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire-Resistive	80 Ft.	No Limit	No Limit	No Limit
Type III — Heavy Timber*	Two	12,000	12,000	Not Permitted
Type IV — Non-Combustible*	Two	12,000	12,000	Not Permitted
Type V — Ordinary*	Two	12,000	12,000	Not Permitted
Type VI — Wood Frame*	Two	8,000	8,000	Not Permitted

*Floors located immediately above usable space in basements or cellars shall be a fire-resistive rating of not less than one-hour except where an approved automatic sprinkler system is provided; provided, however, that where basements or cellars are used as classrooms or assembly rooms they shall be counted as a story.

**At least one-hour interior fire-resistive construction shall be used throughout in all Group "C" (schools), two or more stories in height.

SECTION 407 — GROUP "D" — INSTITUTIONAL

407.1 — SCOPE

Buildings in which more than six people are detained for penal or correctional purposes; or in which the liberty of the inmates is restricted, or places of involuntary dentention, shall be classified in Group D-1.

Buildings in which more than ten people are harbored for medical, charitable or other care or treatment shall be classified in Group D-2.

Group D-1 — Institutional Occupancy — shall include, among others, the following:

Insane Asylums

Reformatories

Jails

Prisons

Group D-2 — Institutional Occupancy — shall include, among others, the following:

Hospitals

Sanitariums

Orphanages

Old Peoples Homes

407.2 — EXCEPTION

Dormitories for doctors, nurses, and able-bodied help (not for patients or inmates) of Institutional buildings shall be classified as Group A — Residential Occupancy.

407.3 — PROTECTIVE REQUIREMENTS — GROUP "D" OCCUPANCY

	SECTION
1. Allowable Height and Area	407.5
Heights and Areas are based upon type of construction used.	
2. Types of Construction	601 to 609, inclusive
3. Exit Requirements	1101 to 1119, inclusive
4. Protection of Vertical Openings	701 to 701.4, inclusive
5. Protection of Wall Openings	703 to 703.7, inclusive
6. Sprinklers and Standpipes	901 to 902, inclusive
7. Mixed Occupancy Separations	412
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII

407.4 — SPECIAL REQUIREMENTS — GROUP "D" OCCUPANCY

	SECTION
1. Separation of Boiler or Furnace Room	801.2
2. Special Exit Doorway Requirements	1110
3. Special Exit Requirements for Sanitoriums	1104
4. Non-Combustible Stairways Required	1108
5. Handling and Storage of Combustible Film	501.3
6. Storage and Handling of Flammable Liquids shall be prohibited.	

407.5 — GROUP "D" INSTITUTIONAL OCCUPANCY — HEIGHT AND AREA RESTRICTIONS

	ALLOWABLE HEIGHTS Type Construction Used*	ALLOWABLE AREAS Area Per Floor (Sq. Ft.)		
	Story Height	One Story	Two Stories	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire-Resistive	80 Ft.	No Limit	No Limit	No Limit
Type III — Heavy Timber				
Group D-1	Not Permitted			
Group D-2	Two	12,000	8,000	Not Permitted
Type IV — Non-Combustible				
Group D-1	Not Permitted			
Group D-2	Two	7,000	4,000	Not Permitted
Type V — Ordinary				
Group D-1	Not Permitted			
Group D-2	Two	7,000	4,000	Not Permitted
Type VI — Wood Frame				
Group D-1	Not Permitted			
Group D-2	One	5,000	Not Permitted	Not Permitted

*At least one-hour fire-restrictive construction shall be provided throughout all buildings.

SECTION 408 — GROUP "E" — ASSEMBLY

408.1 — SCOPE

Buildings in which provision is made for the congregation or gathering of seventy-five (75) or more persons in one room or space shall be classified in Group E — Assembly Occupancy. Such room or space shall include any occupied connecting room or space in the same story, or in a story or stories above or below, where entrance is common to the rooms or spaces. This occupancy includes buildings having an auditorium and a stage provided for the use of movable scenery, or having an auditorium for viewing motion pictures or for theatrical purposes.

Group E — Assembly Occupancy shall include, among others, the following:

Passenger Depots
Libraries
Stadiums and Grandstands
Restaurants (large)
Amusement Park Buildings
Tents (Assembly)
Bowling Alleys
Theaters
Motion Picture Houses
Public Assembly Halls
Churches
Museums
Auditoriums
Dance Halls
Recreation Halls
Gymnasiums

408.2 — SUB-CLASSIFICATIONS

Group E shall be divided into two sub-classifications as set forth in this Section, both of which shall comply with the requirements for Group E Occupancy unless otherwise specified:

(a) Group E-1 — Large Assembly

Group E-1 shall include theaters and places of public assembly having a working stage (see definition) and having a capacity of seven hundred (700) or more people; also, Group E-1 shall include theaters or places of assembly having a non-working stage but having a capacity of 1,000 or more people.

(b) Group E-2 — Small Assembly

Group E-2 shall include theaters and places of assembly having a capacity of 75 or more persons but having a capacity less than designated for Group E-1.

408.3 — METHOD OF DETERMINING CAPACITY

The capacity or occupant content of theaters and places of assembly shall be determined according to the actual number of persons that will occupy the space. In computing the occupancy capacity, the capacity shall not be less than six (6) square feet of floor area per person with fixed seats, or fifteen (15) square feet of floor area per person where fixed seats are not provided.

408.4 — PROTECTIVE REQUIREMENTS — GROUP "E" OCCUPANCY

SECTION

1. Allowable Height and Area 408.6
   Heights and Areas are based upon type of construction used.
2. Types of Construction ..... 601 to 609, inclusive
3. Exit Requirements ..... 512.5 to 512.18, inclusive
4. Protection of Vertical Openings ..... 701 to 701.4, inclusive
5. Protection of Wall Openings ..... 703 to 703.7, inclusive
6. Sprinklers and Standpipes ..... 901 to 902, inclusive
7. Mixed Occupancy Separations 412
8. Light, Ventilation and Sanitation ..... 2001 to 2002, inclusive
9. Heating Requirements ..... Chapter VIII

408.5 — SPECIAL REQUIREMENTS — GROUP "E" OCCUPANCY

SECTION

1. Separation of Boiler or Furnace Room 801.2
2. Special Exit Doorway Requirements 1110
3. Non-Combustible Stairway Requirements 1108
4. Special requirements governing the necessary features for total protection of Group "E" Assembly Occupancies, shall be in accordance with Section 512.
5. Tents 504.2
6. Bowling Alleys 513
7. Stadiums and Grandstands 510
8. Amusement Park Buildings 511
9. Restaurants, Ratproof Construction Required ..... Chapter XIX
10. Storage and handling of flammable liquids shall be prohibited.

408.6 — GROUP "E" ASSEMBLY OCCUPANCY — HEIGHT AND AREA RESTRICTIONS

ALLOWABLE HEIGHTS Type Construction Used		ALLOWABLE FLOOR AREA Area Per Floor (Sq. Ft.)		
	Story Height	One Story	Two Stories	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire Resistive	80 Ft.	No Limit	No Limit	No Limit
Type III — Heavy Timber*				
Group "E" 1 Working Stage	Not Permitted			
Group "E" 1 Non-Working Stage*	One	12,000	Not Permitted	
Group "E" 2 Working Stage	One	10,000	Not Permitted	
Group "E" 2 Non-Working Stage*	Two	12,000	7,000	
Type IV — Non-Combustible**				
Group "E" 1 Working Stage	Not Permitted			
Group "E" 1 Non-Working Stage	One	8,000	Not Permitted	
Group "E" 2 Working Stage	One	6,000	Not Permitted	
Group "E" 2 Non-Working Stage	Two	8,000	8,000	
Type V — Ordinary**				
Group "E" 1 Working Stage	Not Permitted			
Group "E" 1 Non-Working Stage	One	8,000	Not Permitted	
Group "E" 2 Working Stage	One	6,000	Not Permitted	
Group "E" 2 Non-Working Stage	Two	8,000	8,000	
Type VI — Wood Frame				
Group "E" 1	Not Permitted			
Group "E" 2 Working Stage	One	3,000	Not Permitted	
Group "E" 2 Non-Working Stage	One	5,000***	Not Permitted	

*Buildings which are surrounded on all sides by a permanent open space of not less than sixty (60) feet and provided with an approved automatic sprinkler system and where the roof structure is twenty (20) feet or more clear above any floor or balcony shall not be limited in area.

**One-hour fire-resistive floors shall be required. ***May be increased 33⅓ percent for places of worship.

SECTION 409 — GROUP "F" — STORAGE

409.1 — SCOPE

Buildings which are used for the storage of goods, wares or merchandise, excepting limited storage incidential to the display, sale or manufacture of such goods, wares or merchandise, shall be classified in Group F — Storage Occupancy.

Group "F" — Storage Occupancy — shall include, among others, the occupancies listed in this Section, but does not include buildings used to store highly combustible, inflammable or explosive products or materials (See Section 411):

Airplane Hangars
Coal Pockets
Garages
Warehouses
Storage Buildings
Freight Depots

409.2 — PROTECTIVE REQUIREMENTS—GROUP "F"—STORAGE

	SECTION
1. Allowable Height and Area Heights and Area are based upon type of construction used.	409.4
2. Types of Construction	601 to 609, inclusive
3. Exit Requirements	1101 to 1119, inclusive
4. Protection of Vertical Openings	701 to 701.4, inclusive
5. Protection of Wall Openings	703 to 703.7, inclusive
6. Sprinklers and Standpipes	901 to 902, inclusive
7. Mixed Occupancy Separations	412
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII

409.3 — SPECIAL REQUIREMENTS — GROUP "F" — STORAGE

	SECTION
1. Separation of Boiler or Furnace Room	801.2
2. Non-combustible Stairway Requirements	1108
3. Occupancy Permit for Changed Floor Loads	1207
4. Posting of Floor Loads Required	110
5. Airplane Hangars	502
6. Coal Pockets	503
7. Garages	
Private	506
Public	508
8. Storage and handling of flammable liquids shall conform to	501.1 (f)
9. Ratproof Construction Required	Chapter XIX

409.4 — GROUP "F" — STORAGE OCCUPANCY — HEIGHT AND AREA RESTRICTIONS

Type Construction Used	ALLOWABLE HEIGHT	ALLOWABLE FLOOR AREA** Area Per Floor (Sq. Ft.)		
	Story Height	One Story	Two Stories	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire-Resistive	Six	30,000	30,000	20,000
Type III — Heavy Timber*	Six	18,000	18,000	10,000
Type IV — Non-Combustible*	Four	16,000	16,000	10,000
Type V — Ordinary*	Four	16,000	16,000	10,000
Type VI — Wood Frame	One	6,000	Not Permitted	

*When over two stories in height, an approved automatic water sprinkler shall be installed throughout the building.

**May be increased beyond the areas set forth in the above table, (See Section 403).

SECTION 410 — GROUP "G" — INDUSTRIAL

410.1 — SCOPE

Buildings in which work or labor is performed in connection with the fabrication, assembly, processing, etc., of products or materials shall be classified in Group G — Industrial Occupancy. Group G — Industrial Occupancy — shall include, among others, the occupancies listed in this Section, but does not include buildings used for any purpose involving highly combustible, inflammable, or explosive products or materials (See Section 411):

Manufacturing Plant	Processing Plant
Factory	Mill
Assembly Plant	

410.2 — PROTECTIVE REQUIREMENTS — GROUP "G" — INDUSTRIAL

	SECTION
1. Allowable Height and Area	410.4
(a) Exception to Area Restrictions	403
(b) Unlimited Areas	403.7
Heights and Areas are based upon type of construction used.	
2. Types of Construction	601 to 609, inclusive
3. Exit Requirements	1101 to 1119, inclusive
4. Protection of Vertical Openings	701 to 701.4, inclusive
5. Protection of Wall Openings	703 to 703.7, inclusive
6. Sprinklers and Standpipes	901 to 902, inclusive
7. Mixed Occupancy Separations	412
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII
(a) Special High Temperature Requirements	803 to 804, inclusive
(b) High Pressure Boilers and Metal Smokestacks	805
(c) Duct Construction	817

410.3 — SPECIAL REQUIREMENTS—GROUP "G"—INDUSTRIAL

	SECTION
1. Occupancy Permit Required for Changed Floor Loads	1207
2. Posting of Floor Loads Required	110
3. Storage and Handling of Flammable Liquids Shall Conform to	501.1 (f)
4. Ratproof Construction Required Where Food Is Processed	Chapter XIX

410.4 — GROUP "G" — INDUSTRIAL OCCUPANCY — HEIGHT AND AREA RESTRICTIONS

Type Construction	ALLOWABLE HEIGHT	ALLOWABLE FLOOR AREA* Area Per Floor (Sq. Ft.)		
	Story Height	One Story	Two Stories	Over Two Stories
Type I — Fireproof	No Limit	No Limit	No Limit	No Limit
Type II — Fire-Resistive	80 Ft.	No Limit	30,000	20,000
Type III — Heavy Timber**	Six	21,000	21,000	11,000
Type IV — Non-Combustible***	Four	21,000	15,000	10,000
Type V — Ordinary***	Four	15,000	12,000	9,000
Type VI — Wood Frame	One	10,000	Not Permitted	Not Permitted

*For Unlimited areas see Section 403.6. Other allowable area increases see Section 403.

**In Type III buildings over 3 stories, sprinklers shall be required.

***In buildings over two stories, sprinklers shall be required.

SECTION 411 — GROUP "H" — SPECIAL HAZARDOUS

411.1 — SCOPE

Buildings or structures used for purposes that involve highly combustible, inflammable or explosive products or materials or that constitute exceptional fire hazards, because of the form, character or volume stored, processed or manufactured, shall be classified in Group H — Hazardous Occupancy.

GROUP H — Special Hazardous Occupancy — shall include among others, the following:

Dry Cleaning Establishments
Grain Elevators
Storage or use of Highly Combustible Materials
Storage of Combustible Film

411.2

The processing, manufacturing or storing of the following materials, among others, shall be classified as a special fire hazard, (Group "H" — Special Hazardous Occupancy), because of the highly combustible and explosive quality of the materials involved. They shall be classified in two groups as set forth below:

(A) The following materials or products stored shall be classified as Group "H" — Special Hazardous Occupancy, regardless of the volume or quantity stored or handled:

Acids: Sulphuric, Nitric or Hydroflouric — Calcium Carbide — Asphaltum — Celluloid. Chemicals: Poisonous, combustible, explosive —Cereal, flour or feed mills — Cork — Excelsior — Petroleum Products (Not retail gasoline service stations) — Pyroxylin and Pyroxylin Plastic Products — Shoddy Mills — Loose Spices and Vegetable Stocks (not retail stores) — Explosives — Feather Renovating — Films (see Section 501.3) — Fireworks — Gas: Poisonous irritating and flammable — Jute — Kapok — Munitions — Naval Stores — Nitrate of Soda — Paper. Baled Waste — Oakum or Hemp Processing — Paints: Manufacturing — Starch Mills —Waste Paper —Rubber Manufacturing Plants.

(B) Materials or products stored or handled in quantities in excess of the cubic foot areas set forth below shall be classified as Group "H" — Special Hazardous Occupancy:

	In Excess of
Acetylene gas in pressure release containers	2000 cu. ft.
Artificial flowers	1200 cu. ft.
Artificial leather	600 cu. ft.
Bags—Burlap, paper or cotton	1000 cu. ft.
Barrels—second hand	1800 cu. ft.
Brooms and Broom corn	1200 cu. ft.
Cotton (Loose) Wadding or Waste	400 cu. ft.
Drugs	6500 cu. ft.
Enameling	2400 cu. ft.
Fertilizer (Bags only)	2700 cu. ft.
Lacquers (Separate containers only)	3600 cu. ft.

	In Excess of
Matches	300 cu. ft.
Mattresses	4800 cu. ft.
Paints.....(Separate metal containers only)	6000 cu. ft.
Spray painting shops	3200 cu. ft.
Tires (Recapping)	Over four recapping machines
Tires—storage	4000 cu. ft.
Varnish—Turpentine (Separate metal containers only)	2400 cu. ft.

411.3 — PROTECTIVE REQUIREMENTS — GROUP "H" — SPECIAL HAZARDOUS

	SECTION
1. Prohibited in Fire Districts	301
2. Allowable Height and Area	411.5
Heights and Areas are based upon types of construction used.	
3. Types of Construction	601 to 609, inclusive
4. Exit Requirements	1101 to 1120, inclusive
5. Protection of Vertical Openings	701 to 701.4, inclusive
6. Protection of Wall Openings	703 to 703.7, inclusive
7. Sprinklers and Standpipes	501.2 (d), and 901 to 902, inclusive
8. Light, Ventilation and Sanitation	2001 to 2002, inclusive
9. Heating Requirements	Chapter VIII
10. Duct Construction	817
11. Separation of Boiler or Furnace Room	801.2
12. Mixed Occupancy Separation	412

411.4 — SPECIAL REQUIREMENTS — GROUP "H" — SPECIAL HAZARDOUS

The hazards involved under Group "H"—Special Hazardous—require provisions that give adequate protection for these special occupancies. The occupancies in this group shall conform to the special requirements as set forth in Section 501.

411.5 — GROUP "H" — SPECIAL HAZARDOUS OCCUPANCIES, HEIGHT AND AREA RESTRICTIONS

Type Construction Used	ALLOWABLE HEIGHT Story Height	ALLOWABLE FLOOR AREAS* Area Per Floor (Sq. Ft.) One Story	Two Stories	Over Two Stories
Type I — Fireproof	Four	11,500	7,500	5,000
Type II — Fire-Resistive	Three	8,300	6,000	4,000
Type III — Heavy Timber	Two	7,500	6,000	Not Permitted
Type IV — Non-Combustible	One	5,000	Not Permitted	
Type V — Ordinary	One	5,000	Not Permitted	
Type VI — Wood Frame	Not Permitted			

*No modification in areas shall be permitted in Group "H" Special Hazardous Occupancies.

Note:—See Chapter V for special and detail requirements of Group "H" Special Hazardous Occupancies.

SECTION 412 — MIXED OCCUPANCY AND SEPARATION REQUIREMENTS

412.1 — DEFINITION

When a building is used for two or more occupancies, classified within different occupancy groups, it shall be considered a mixed occupancy.

412.2 — LIMITATIONS

A mixed occupancy building shall be governed by the height and area limitations applying to the occupancy for which those limitations, as specified in this Code, are the most restrictive.

412.3 — SEPARATION

For each occupancy, the type of construction may be as prescribed for such occupancy in a building of the height and area of the building as a whole, provided each occupancy is wholly separated, horizontally and vertically, by constructions having fire-resistive ratings equivalent to the higher rating prescribed for the two occupancies being separated, as noted in Section 412.5.

412.4 — MINIMUM SEPARATION

Unless, as otherwise specifically prescribed in this Section the separation of mixed occupancies shall provide not less than one (1) hour fire protection, except that portions of buildings used as accessory offices or for customary non-hazardous uses necessary for transacting the principal business of Group F Storage and Group G Industrial occupancies may be separated by partitions of non-combustible construction without fire-protection or by partitions constructed of materials as permitted in the type of construction used.

412.5 — FIRE-RESISTIVE RATING OF SEPARATION

The minimum fire-resistance of constructions separating any two occupancies in a building of mixed occupancy, shall be the higher rating required for the occupancies being separated, as specified below:

MINIMUM REQUIREMENTS*

Group A—Residential	1 Hr. fire-resistive separation
Group B—Business	1 Hr. fire-resistive separation
Group C—School	2 Hr. fire-resistive separation
Group D—Institutional	2 Hr. fire-resistive separation
Group E-1—Large Assembly	4 Hr. fire-resistive separation
Group E-2—Small Assembly	2 Hr. fire-resistive separation
Group F—Storage	4 Hr. fire-resistive separation
Group G—Industrial	2 Hr. fire-resistive separation
Group H—Special Hazardous	4 Hr. fire-resistive separation

A separation between a private garage and any occupancy shall be the minimum fire-resistance specified above for the occupancy except in the case of a one or two-family dwelling no fire-resistive separation shall be required. No separation shall be required between a Sunday School room, or rooms, and a Church Auditorium of Group E-2 Small Assembly.

*For materials and assemblies to provide the required fire-resistive construction, see Chapter X.

412.6 — PROTECTION OF HORIZONTAL OPENINGS

For requirements governing the protection of door openings in walls and partitions separating mixed occupancies, see Section 703.4.

412.7 — PROTECTION OF VERTICAL OPENINGS

For requirements governing the protection of vertical openings, see Section 701.

CHAPTER V

SPECIAL OCCUPANCY REQUIREMENTS

SECTION 501 — GROUP H: HAZARDOUS OCCUPANCIES

501.1 — GENERAL REQUIREMENTS

(a) Buildings of occupancies in Group H not specifically provided for in this Code, which involve the storage, manufacture, or use of highly combustible or flammable materials shall be constructed to provide a degree of fire protection adequate for the hazard involved. Such protection may exceed the fire-resistive requirements prescribed for Type I, Fireproof construction, if deemed necessary by the Building Official, but in all cases the construction shall meet the minimum requirements specified for Group H occupancies.

(b) Approved automatic sprinklers shall be installed throughout all buildings of Group H occupancies except that where the nature of the fire hazard is such that application of water is not effective as a means of protection other approved means of protection shall be provided.

(c) Buildings of Group H occupancies shall not be located in Fire District No. 1.

(d) Warehouses used to store combustible fibres such as cotton, sisal, jute, hemp, kapok, excelsior and similar materials having a flash fire hazard, shall be limited to story heights of not over 12 feet, floor to ceiling, and no single storage compartment shall exceed 5,000 square feet in floor area or 36,000 cubic feet in capacity.

(e) Stables, for storing hay, which do not exceed 1 story and storage loft, or a maximum of 20 feet in height, and do not exceed 3,000 square feet in floor area, may be of Type VI Wood Frame construction if located 30 feet or more from adjoining property lines and other structures.

(f) Buildings or structures of occupancies involving the use of highly combustible material or processes, and their equipment, shall be erected, altered, and installed in accordance with safe practice. Except as otherwise provided in this Code, the provisions of the various regulations or standards of the National Fire Protection Association governing the particular occupancy shall be considered as constituting safe practice. Those standards include, among others, the following:

N.F.P.A. Standards for the Storage, Handling and Use of Flammable Liquids (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Standards for Spray Finishing Using Flammable Materials (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Standards for Dip Tanks Containing Flammable or Combustible Liquids (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Standards for the Installation and Operation of Gas Systems for Welding and Cutting (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Standards for the Storage and Handling of Liquefied Petroleum Gases (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Recommended Good Practice Requirements for the Installation and Use of Internal Combustion Engines and Recommended Good Practice Requirements for the Installation and Use of Coal Gas Producers (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Standards for the Storage and Handling of Pyroxylin Plastic in Warehouses and Wholesale Jobbing and Retail Stores (National Fire Codes, Volume II, 1959 Edition).

N.F.P.A. Standards for the Storage, Handling and Use of Pyroxylin Plastic in Factories Making Articles Therefrom (National Fire Codes, Volume II, 1959 Edition).

N.F.P.A. Standards for the Storage and Handling of Combustible Fibres (National Fire Codes, Volume II, 1959 Edition).

N.F.P.A. Standards for the Installation, Maintenance and Use of Gasoline Vapor Gas Machines, Lamps and Systems (National Fire Codes, Volume I, 1959 Edition).

N.F.P.A. Standards on the Fundamental Principles for the Prevention of Dust Explosions in Industrial Plants (National Fire Codes, Volume II, 1959 Edition).

N.F.P.A. Code for the Prevention of Dust Explosions in the Manufacture of Aluminum Bronze Powder (National Fire Codes, Volume II, 1959 Edition).

Note: The above standards published by the National Fire Protection Association in the several volumes of National Fire Codes may be obtained from them at 60 Batterymarch Street, Boston, Mass.

501.2 — DRY CLEANING, DYEING OR SIMILAR HIGH FIRE HAZARD OCCUPANCY

(a) No building used for dry cleaning or similar hazardous occupancy shall be located within Fire District No. 1, unless only nonflammable liquids are used for cleaning purposes.

(b) Dry cleaning, dyeing, or similar establishments using combustible or flammable liquids or solvents with a flash point of 190° F, or lower (closed cup test), shall be of Type I, Fireproof, or Type II, Fire-Resistive construction, and shall not exceed 1 story in height or 10,000 square feet in area, without attics, concealed roof spaces, basements or pits. Floors shall not be below grade.

(c) Roofs shall be flat. If, due to local conditions, the Building Official deems it desirable to vent possible explosions upward, the roof may be of light, non-combustible construction.

(d) An approved automatic sprinkler system shall be installed throughout each drying room in accordance with Section 901 of Chapter IX.

(e) Partitions shall be of not less than 2-hour fire-resistive construction, as set forth in Section 1002.

(f) Drying rooms, if under the same roof as the dry cleaning and dry dyeing rooms, shall be separated from such rooms by each wall having a fire-resistance of not less than 4 hours. The entrance to such drying rooms shall be provided with self-closing fire doors.

(g) Except for necessary openings for vents, ducts, piping and shafting, all openings in exterior walls shall be protected with fire resistive doors or windows. Windows shall be of wire glass in metal sash so hung that they will readily swing out in case of explosion.

(h) Exterior walls except those on street fronts, which are located less than 10 feet from adjacent property lines shall have no openings therein and shall have a fire-resistance rating of not less than four hours, or the equivalent, but in no case shall more than two sides of the building have blank walls.

(i) Skylights shall be provided. They shall be constructed with metal frame and sash with plain thin glass and with wire screen provided above the skylight as prescribed in Section 707, or with wire glass arranged to swing outward readily in case of an explosion.

(j) Mechanical systems of ventilation, of explosion-proof type, shall be provided to insure complete and continuous change of air once every 3 minutes in dry-cleaning and dry-dyeing rooms.

(k) All other regulations contained in this Code pertaining to construction, ventilation, storage, heating and lighting, or the like, shall apply as well as any laws of the State regulating the construction and maintenance of dry-cleaning, dyeing, or similar plants.

(l) The installation, ventilation, erection, alteration, maintenance or use of equipment, of buildings or structures for dry-cleaning or dry-dyeing purposes shall be in accordance with the provisions of the "Standards of the National Fire Protection Association for Dry Cleaning and Dry Dyeing Plants" (National Fire Codes, Volume II, 1959 Edition).

501.3 — HANDLING OR STORAGE OF COMBUSTIBLE FILM

(a) Construction of Buildings Where Films Are Stored or Processed.

All buildings in which films are stored or processed, such as film exchanges, film laboratories, motion picture studios, etc. shall be of Type I or Type II construction and shall be equipped throughout with approved automatic sprinklers in accordance with Section 901 of Chapter IX. Such buildings shall not be located in Fire District No. 1 and shall not exceed the maximum height and area limitations specified for Group H in Section 411.5.

The following regulations shall govern the handling and storage of combustible film except that they do not apply to the following: Films in original packages in quantities less than 50 cubic feet, and films stored in motion picture projection booths (See Section 512.25).

Except as otherwise specified herein, the handling and storage of combustible film shall be governed by the "Standards of the National Fire Protection Association for Storage and Handling of Cellulose Nitrate Motion Picture Film". (National Fire Codes, Volume II, 1959 Edition).

All rooms in which combustible films are stored or handled, except motion picture projection booths and film vaults, shall be enclosed in partitions of non-combustible construction having not less than 2 hours fire-resistance. Openings in such partitions shall be protected by approved fire doors. Floors and ceilings of such rooms shall provide fire-resistance of not less than 2 hours and vents that open automatically in case of fire shall also be provided. Tables and racks used in connection with the handling of film shall be of metal or other non-combustible material and shall be at least 4 inches away from any radiator or heating apparatus. Fire-fighting appliances using water, or water solutions, shall be provided in every room. In rooms where film is stored or handled in quantities greater than 50 lbs., cabinets shall be provided with insulated metal vents. Film storage rooms in which two or more persons work, shall have at least two exits remote from each other.

Combustible film in amounts of more than 1,000 lbs. shall be kept in vaults constructed as prescribed in this Section.

Amounts of combustible film in excess of 25 lbs. shall be kept in approved metal cabinets of capacity not exceeding 375 lbs. Cabinets having a capacity of over 50 lbs. of film, shall be provided with insulated metal vents of at least 14 square inches per 100 lbs. of film. Cabinets holding over 75 lbs. of film shall be provided with at least one automatic sprinkler, unless so built that each roll is in a separate compartment so constructed that the film will burn out without communicating fire to film in any other compartment.

Unexposed film, when stored in the original shipping cases with each roll in a separate container, shall be stored only in a room provided with an approved automatic sprinkler system. (Section 901 of Chapter IX.)

(b) Film Vaults.

Vaults used for the storage of combustible film shall not exceed 750 cubic feet inside and shall not be located near chimneys or other sources of heat.

Walls, floors and roofs of film vaults and their supports shall be of not less than 4-hour fire-resistive construction built without cracks or holes that will permit escape of gases. Drains, or scuppers, to the outside of the building shall be provided. All door openings shall be protected with approved fire doors on each face of the wall; the inner door shall be automatic, the outer door shall be of the self-closing swinging type.

Each vault shall have an independent vent having not less than 140 square inches effective area per 1,000 lbs. of film capacity (equivalent to 70 square inches per 100 standard rolls) but the vent area for a vault of 750 cubic feet shall in no case be less than 1400 square inches. Vents shall be of non-combustible materials and shall be located at least 50 feet from all openings exposed thereto.

Film shall be protected against ignition by rays of the sun and by radiated heat.

Vaults shall have no skylights or glass windows except as specified for vents. Vents may be protected against the weather by a single thickness of glass (1/16" thick) not less than 200 square inches in area, in a sash arranged to open automatically in case of fire, or by equivalent protection.

Vaults shall be protected by an approved system of automatic sprinklers (Section 901 of Chapter IX) with a ratio of one head to each 62½ cubic feet of total vault space. A vault of 750 cubic feet shall have not less than 12 sprinkler heads.

Wire guards shall be provided so that no film could be placed within 12 inches of heating pipes or radiators.

Vault heating shall be automatically controlled so as not to exceed a temperature of 70 degrees F. or a steam pressure of 10 lbs.

All racks and equipment in vaults shall be of metal or other non-combustible material.

501.4 — GRAIN ELEVATORS

(a) Grain elevators, or structures used to store grain, shall not be located within fifty (50) feet of adjoining property lines of other structures, except railway rights of way of adjoining navigable waters, nor shall they be located within Fire District Number One.

(b) Grain elevators, or structures used to store grain, shall be constructed of steel, concrete, or other non-combustible material or with lumber exterior or interior framing, including plank and laminated walls, when the sizes of the members used conform to the re

quirements for Type III—Heavy Timber Construction to meet the approval of the Building Official, and all such structures, buildings, and equipment shall be erected, altered, or installed in accordance with the provisions of Section 501.1 (f).

(c) Where combustible material, other than grain, is present in quantity sufficient to produce a serious fire, fire protection equivalent to Type I construction shall be provided unless approved automatic sprinkler protection is provided (Section 901 of Chapter IX). In no case, however, shall the requirements for grain elevators, or grain storage buildings, be less restrictive than those applying to Group H occupancies.

SECTION 502 — AIRPLANE HANGARS

(a) Airplane hangars may be of any type of construction, except that if located within 50 feet of a common property line or of the opposite side of a public street or thoroughfare or other building, the hangar shall be Type I, Fireproof, or Type II, Fire-Resistive or Type III—Heavy Timber Construction.

(b) The floor areas of hangars shall not exceed those permitted for Group F storage buildings in Section 409.4 (see area exceptions, Section 403).

(c) Where hangars have basements, the floor over the basement shall be of Type I Fireproof construction and shall be made tight against seepage of water, oil or vapors. There shall be no opening or communication between basement and hangar. Access to basement shall be from outside only.

(d) Floors shall be graded and drained to prevent water or gasoline from remaining on the floor. Floor drains shall discharge through an oil separator to the sewer or to an outside vented sump.

(e) Heating of hangars shall be from plants located in a detached building.

(f) The process of "doping", involving use of a volatile flammable solvent, or of painting, shall be carried on in a separate detached building equipped with automatic sprinkler equipment in accordance with Section 901 of Chapter IX.

(g) Each hangar of area exceeding 10,000 square feet shall be equipped with approved automatic sprinklers in accordance with Section 901 of Chapter IX.

SECTION 503 — COAL POCKETS

Coal pockets, and other similar structures, shall be constructed of steel, concrete, or other non-combustible material, or of lumber sizes which meet the requirements of Type III—Heavy Timber Construction to meet the requirements of this Code and the approval of the Building Official.

SECTION 504 — TEMPORARY STRUCTURES

504.1 — PERMIT

A special building permit for a limited time must be obtained before the erection of Temporary Structures such as construction sheds, seats, canopies, tents and fences used in construction work or for temporary purposes such as reviewing stands. Such structures shall be completely removed upon the expiration of the time limit stated in the permit.

504.2 — TENTS FOR PUBLIC ASSEMBLY

Before a temporary permit is granted, the owner or agent shall file with the Building Official a certificate executed by an acceptable testing laboratory, certifying that the tent, decorative materials and tarpaulins meet the requirements for resistance to fire prescribed in the National Fire Protection Association Standard for Flameproofed Textiles (National Fire Codes, Volume III, 1959 Edition) and that such fire-resistance is effective for the period for which the permit is to be granted.

(a) **Tent Exits**—Tent exits, aisles, seating, etc., shall conform with the requirements for places of assembly. All exits shall be kept free and clear of obstructions while the tent is occupied by the public.

(b) Ground within and adjacent to tents shall be cleared of all grass, underbrush or similar fire hazards.

504.3 — TEMPORARY SEATS

A special permit shall not be issued unless all seats, stands and structures conform to the requirements of Section 1203 of Chapter XII (Minimum Design Loads). All seats shall be marked allowing a space for each person of not less than eighteen inches in width. Aisles and seating arrangements shall conform to the requirements of Assembly Occupancies (Section 512.12).

SECTION 505 — FILLING STATIONS

505.1

Filling stations of Group B shall include buildings on lots used for the purpose of supplying motor fuel to tanks of motor vehicles for immediate use. Such buildings shall have no cellars or basements but may have open pits if such pits are continually ventilated. Filling stations shall be of Type I, Fireproof; Type II, Fire-Resistive; Type III, Heavy Timber; Type IV, Non-Combustible; Type V, Ordinary, or Type VI.

505.2

Where filling stations are located 20 feet or less from property lines or adjacent buildings and the total floor area of the station exceeds 1,000 square feet, exterior walls shall provide not less than 1-hour fire-resistance. No openings shall be placed in exterior walls of filling stations which are located 5 feet or less from property lines or adjacent structures.

505.3

Canopies and their supports, over pumps, shall be of non-combustible materials, or of construction providing 1-hour fire-resistance.

505.4

All equipment likely to cause an explosion, or to be capable of igniting gasoline vapor from heat, sparks, or open flames, shall be located at least 4 feet above the floor, or be completely and tightly enclosed by non-combustible construction, or construction of not less than 1-hour fire-resistance. Any openings to such enclosures shall be from the outside with the sill raised at least 1 foot above the adjoining outside level, and shall be located at least 5 feet from any property line or adjacent building.

SECTION 506 — PRIVATE GARAGES

506.1

Garages which are provided for the storage of motor vehicles owned by tenants of buildings on the premises, and with maximum undivided space used for storage of not more than four automobiles, or trucks of one ton or less capacity, but not exceeding 850 square feet, shall be considered private garages. All other garages shall be considered public garages.

506.2

Private garages may be of Type I, II, III, IV, V or VI construction, but no private garage shall occupy space above the first floor of Type VI building or shall be erected in the fire districts except as provided in Section 304.2. No private garage shall be located within, or attached to, a building occupied for any other purpose, unless it is separated from such other occupancy by walls, partitions, floors and ceilings that have a fire-resistance rating as specified in Section 412.5 (Mixed Occupancy Separations). Walls, floors, partitions and ceilings that effect such separation shall be continuous and unpierced. A single flush-type solid core wooden door of not less than 1¾ inch nominal thickness, equipped with a self-closing device, may be permitted provided the sill is raised at least 8 inches above the garage floor when the doorway connects directly with any room in which there is any direct-fired heating device or gas fixture. In no case, however, shall a garage have an opening directly into a room used for sleeping purposes.

SECTION 507 — PARKING LOTS AND PUBLIC PARKING DECKS

507.1 — PARKING LOTS

Open sheds or canopies may be erected up to two-thirds (⅔) the area of a lot, provided such construction is not less than required for Type IV, Non-Combustible, and that all such constructions meet the approval of the Building Official.

507.2 — PUBLIC PARKING DECKS

As defined in Section 201.2, Public Parking Decks may be constructed of Type I Fireproof, Type II Fire-resistive, or Type IV Non-combustible unprotected construction without exterior walls. When such structures are located within six (6) feet of common property lines they shall be provided with an enclosure wall of not less than two (2) hours fire-resistance without openings therein.

Such non-combustible unprotected structures shall be limited to a height of four (4) stories and an area limitation of 30,000 square feet per floor with roof parking permitted. When of Type I Fireproof or Type II Fire-Resistive Construction, the height and area shall not be limited.

Each floor of such structure shall have a continuous wheel guard not less than six (6) inches in height above the floor, with a clear passage of four (4) feet between the wheel guard and edge of structure. In such structures without exterior walls there shall be placed in addition to the wheel guard a continuous protective railing not less than three (3) feet, six (6) inches above the floor around the entire outside perimeter of the structure.

SECTION 508 — PUBLIC GARAGES

508.1

A garage shall be any building or part thereof, wherein is kept or stored a motor vehicle having any gasoline or other volatile inflammable oil in its fuel storage tank, or wherein the painting, repairing or greasing of motor vehicles is performed. A garage exceeding 850 square feet in area, or used to store more than four automobiles, shall be considered a public garage.

508.2

Public garages shall be of Type I, II, III, IV, V, or VI construction. If of Type V construction it shall not exceed one story in height, but shall not exceed the maximum height and areas allowed for Group F storage buildings. Public garages of Type VI may be used only for dead storage and display of automobiles.

508.3

No public garage shall be located within, or attached to, a building occupied for any other purpose, unless it is separated from the other occupancies as prescribed in Section 412, but in no case by walls having fire-resistance less than two hours Fire-Resistive construction. Such separation shall be continuous and unpierced, except for doors leading to salesrooms, or offices, operated in connection with such garages, provided such openings are approved by the Building Official as being required or essential, and provided such openings are equipped with self-closing fire doors conforming to the requirements of Section 703.

508.4

Unenclosed ramps shall not be considered as providing required exit facilities. Enclosed ramps shall be in accordance with the Exit Requirements of Section 1105.5 and with Chapter XI, Exit Requirements.

508.5

Basement and subbasement garages shall be continuously ventilated by a mechanical system with positive means for both inlet and exhaust of at least 1 cubic foot of air per minute per square foot of floor area, controlled from a location close to the entrance door.

508.6

Garage floors shall be covered with concrete or similar non-combustible and non-absorbent material. Floors which drain to sewers or storm drains shall be provided with an oil separator or trap.

508.7

Sprinkler equipment shall be provided as specified in Section 901 of Chapter IX.

508.8

Heating equipment, other than direct-fired unit heaters, shall be placed in a separate room cut off by construction equivalent to 8-inch brick walls and 4-inch reinforced concrete floor and ceiling with no opening except as required for heating pipes and ducts and with outside entrance only.

508.9

Connection between garage and any room having a direct-fired heating device, or gas fixture, shall be by means of a doorway with sill raised at least 8 inches above the garage floor level, or through a vestibule providing two doorway separations.

SECTION 509 — GREENHOUSES

Greenhouses more than 35 feet in height shall have a non-combustible structural frame. Greenhouses not over 400 square feet in area, or 15 feet high, shall be considered accessory structures and may be of any construction except that any greenhouse with wood frames shall be located not less than 5 feet from any adjoining structure or property line.

SECTION 510 — STADIUMS AND GRANDSTANDS

510.1

Stadiums and grandstands may be constructed of steel, iron, reinforced concrete, or wood, designed for live loads and for wind pressures in accordance with the requirements of this Code. They shall not be erected on the roof of any building or structure.

510.2

In stands constructed of wood or other combustible materials, the level of the highest seats above the ground (level of ground at immediate front of the stand) shall not exceed 25 feet, and such stands shall not be located within 20 feet of adjoining property lines, or within 50 feet of adjoining Type VI Wood Frame structures.

510.3

When the space under a stand is used for any purpose, the space shall be enclosed with not less than 1-hour fire-resistive construction and shall meet the separation requirements of Section 412.

510.4

Aisles not less than 3 feet 6 inches wide shall be provided so that there are not more than 20 seats between any seat and an aisle. Where backs are provided, seats shall be spaced not less than 30 inches back to back.

510.5

A distance of 18 inches along any bench shall constitute one seat in figuring the required exit facilities.

SECTION 511 — AMUSEMENT PARK BUILDINGS

511.1

Amusement park buildings used as dining rooms, theaters, or for other purposes shall conform to the requirements of this Code governing the particular use or occupancy.

511.2

Amusement park buildings over one story in height, or 1200 square feet in floor area, shall have exterior walls, floors and their supports of not less than 1-hour fire-resistive construction.

511.3

Where amusement park buildings are located within 30 feet of adjacent property lines, buildings or other structures, the exterior walls shall be constructed of non-combustible materials, or shall be protected to provide not less than 1-hour fire-resistance.

511.4

Structures of open skeleton frame type shall not be limited in height or area, except that grandstands shall comply with the requirements of Section 510.

511.5 — AMUSEMENT STRUCTURES

Amusement structures shall provide adequate safety for all loads to which they may be subjected and shall be equipped with approved safety devices and safeguards.

SECTION 512 — ASSEMBLY OCCUPANCIES

512.1 (a) — SCOPE

This section comprising sub-sections 512.1 through 512.27 shall apply to all places of public assembly, except churches or places of worship which shall be governed by the requirements of Section 514.

512.1(b) — TYPES OF CONSTRUCTION

Buildings of Group E-1 Large Assembly with stage shall be of Type I Fireproof or of Type II Fire-Resistive Construction, except that in auditoriums, ornamental wood, trusses and paneling may be of wood.

Buildings of Group E-1 Large Assembly—without stage shall come within the limitations of use prescribed in Section 408.6.

Buildings of Group E-2 Small Assembly shall come within the limitations of use prescribed in Section 408.6 as modified herein.

Gymnasiums and similar occupancies may have running tracks constructed of wood or unprotected metal.

For requirements for stadiums and grandstands see Section 510, for amusement park structures see Section 511.

Exception to Area Limitations:

Where there are no balconies or galleries in Group E-2, Small Assembly Places, and the assembly floor is located at, or within, 21 inches of street or grade level and all exits meet the street or grade level by ramps having a slope not exceeding 1 foot in 10 feet, the maximum allowable areas of Type III, IV, and V construction may be increased 50 per cent over those specified for Group E Assembly occupancies in Table 408.6.

512.2 — INTERIOR FINISH AND DECORATIONS

Use of combustible materials or materials which develop toxic or noxious gases for interior wall finishes shall not be permitted in Group E Assembly occupancies, except as provided in Section 512.1 and in gymnasiums, wood wall covering may be used on the gymnasium walls. For regulations governing ceiling materials see Section 704.3.

In no event shall imitation leather or other material, consisting of, or coated with, a pyroxylin or similarly hazardous base, be used in Group E, Assembly occupancies. The use of combustible materials for decorative purposes in Group E Assembly occupancies, including among others, curtains, cloth, paper, streamers, draperies, vines, leaves, trees, moss, or other interior decorations, shall be prohibited.

512.3 — WALLS AND PARTITIONS

All walls enclosing stairs, pasageways or corridors (except foyers or waiting space) which are used for exits, or enclosing rooms used for exit purposes in Group E, Assembly buildings, shall be of not less than 2-hour fire-resistive construction.

Where Group E, Assembly occupancy is involved in a building used for any other purpose, separation of occupancies shall be as provided in Section 412.

512.4 — LOCATION OF BUILDING

All buildings of Group E, Assembly occupancy shall front directly upon at least one public street not less than 30 feet wide, in which front shall be located the main entrance and exit of such building.

512.5 — MAIN ENTRANCE DOORWAYS

In no case shall the minimum aggregate width of the main street entrance doorways be less than 10 feet, or less than 20 inches for each 100 persons of the first 1,500 persons or total capacity; 15 inches for each 100 persons over 1,500 but under 2,500 persons, and 10 inches for each 100 persons in excess of 2,500 persons in total capacity. Not more than one step of 8 inches shall be used for such main entrance and exit above the sidewalk, and no gradient shall exceed 1 in 10. Main street entrance doorways shall be in addition to required emergency exit doorways, as set forth in Section 512.9—Main Floor Exits.

512.6 — FOYER

In every Group E-1, Large Assembly Places, a foyer consisting of a space at the main entrance of the auditorium or place of assembly shall be provided. Such foyer, if not directly connected to a public street by all the main entrances or exits, shall have a straight and unobstructed corridor or passage to every such main entrance and exit, equal in minimum width to that required for the main entrance and exit.

The width of foyer at any point shall not be less than the combined width of aisles, stairways, and passageways tributary thereto, but need not exceed the required width of main entrance. The foyer shall be at the same level as the back of the auditorium, and exits leading therefrom shall not have a steeper gradient than 1 foot in 10.

512.7 — WAITING SPACES

In theaters and similar Group E, Assembly occupancies, where persons are admitted to the building at times when seats are not available and are allowed to wait in a lobby or similar space, such use of lobby or similar space shall not encroach upon the required clear width of exits. Such waiting areas shall be separated from the required exitways by substantial permanent partitions or by fixed rigid railings not less than 42 inches high. Additional exits conforming to the requirements of Section 512.8 shall be provided for such waiting space area on the basis of one person for each 3 square feet of waiting area.

512.8 — EXITS

No group E-2, Small Assembly Place, shall have less than two exitways and no Group E-1, Large Assembly Place, shall have less than three exitways except that where more than 1,000 persons are accommodated there shall be at least four exitways. Exits shall be located as remotely from one another as practicable.

Exit through any room or space used as a kitchen, or for preparation of food, shall not be permitted except under such conditions as may be prescribed and approved by the Building Official.

The aggregate clear width of emergency exits from Group E, Assembly occupancies, shall not be less than 16 inches for each 100 persons accommodated, or where no seating arrangements are provided, less than 16 inches for each 1,500 square feet of gross floor area served by such exits, except that where such place of assembly is located in a story above street level, the aggregate width of emergency exits shall be not less than 22 inches for each 450 square feet of gross floor area served by those exits. These emergency exit requirements are in addition and supplemental to the main entrance and exit requirements of Section 512.5.

512.9 — MAIN FLOOR EXITS

In Group E, Assembly occupancies, exits not less in width than the full width of the aisle or aisles leading thereto, shall be provided at the rear of the auditorium or place of assembly, leading into the foyer or into a passageway to the street.

Additional emergency exits located in the front half of the auditorium, preferably on each side, shall be provided on the main floor of all Group E, Assembly occupancies. The number of exits shall be as required in Section 512.8. Exits shall be divided approximately equally on each side of the auditorium.

Exits shall be so located that maximum distance of travel to an exit shall not be greater than 100 feet.

Doorways in required emergency exits of main floor shall have a minimum clear width of 5 feet. The aggregate width of the emergency exit shall be not less than required by Section 512.8.

Exits shall have doors opening outward, and shall open directly upon a street or upon an exit court, or upon corridors connected with an exit court. Each such corridor shall have a width not less than the required width of the largest door opening into the corridor plus one-half the sum of the widths of all other doors leading into the corridor, but in no case less than 80 per cent of the aggregate width of all such openings. There shall be no openings other than exits in such corridors. Exit doors shall be hung so as not to decrease the required width of passageways.

512.10 — BALCONY AND GALLERY ENTRANCES AND EXITS

For balconies or galleries of Group E, Assembly occupancies having a seating capacity of over 50, at least two exits shall be provided, one from each side of every balcony or gallery, leading directly to a street or exit court. The number of exits shall not be less than specified in Section 512.8.

All exits shall be served by stairs or ramps completely enclosed and protected as elsewhere prescribed in this Section. Such exits, from balconies or galleries, shall have a total aggregate width of not

less than 22 inches for each 150 persons or seats, or major fraction thereof, in the balcony or gallery served by such exits where fixed seating arrangements are used, or not less than 16 inches for each 1,000 square feet gross floor area where no seating arrangement is provided. No exit shall be less than 44 inches clear width.

Emergency exits shall be located remote from main exits and from each other and shall be equally divided on each side of balcony or gallery. Exits shall be so located that maximum travel distance from any seat to an exit shall be not greater than 100 feet.

Exits leading from balcony to foyer shall have a combined width of not less than 22 inches for every 150 seats or major fraction thereof. The lowest flight of stairs to a public lobby or foyer on the main floor may be open when such lobby or foyer is separated from the place of assembly by 2-hour fire-resistive walls with protected openings.

All exits which are combined shall continue the full combined width to the street.

Stairs emptying into exit courts shall be located to meet the court floor at a clear distance at least equal to the stair width from the near side of any main floor exit into such exit court.

512.11 — EXIT COURTS

All exits of Group E, Assembly occupancies, not opening directly upon a street, shall be accommodated or served by an exit court consisting of a space open to the sky or a passageway of Type I Fireproof or Type II Fire-Resistive construction. Such courts shall be not less than 5 feet in width, but in no case less width than required for exit doorways in Section 1105.3. Such courts shall extend full width to a street, or shall be connected to the street by a passageway or corridor of the same required width, not less than 7 feet in height, of Type I Fireproof construction. Where enclosed passageways are used, they shall be vented to the outer air by wire mesh grilles with ventilation area at least equal to one-tenth of the floor area of such exit passageway. Slope of courts or passage shall not exceed one in 10. All door openings into courts or passageways shall be arranged not to decrease the required clear width of court when open. Where an exit passage extends through the stage portion of a theater, or place of assembly, there shall be no opening between such stage portion and the exit court.

512.12 — AISLES AND SEATING

Every aisle shall lead to an exit door or to a cross aisle running parallel to the seats and leading directly to an exit.

Aisles, cross-aisles, corridors, and passageways shall be of width at least equal to the minimum width required for exits in this Code, but in no case shall the width of an aisle or cross-aisle be less than the width of the widest aisle, passage, cross-aisle or exit which it serves. No aisle shall be less in width than 36 inches, measured at its

narrowest point at the end farthest from the foyer, plus an increase of 1½ inches for each 5 feet of length of such aisle from its beginning to an exit, except that aisles with seats on one side only may be 6 inches less in width, and except that when not to exceed 60 seats are served by an aisle, its width may be 30 inches. Where egress is provided at both ends of an aisle, the aisle may have a uniform width not less than the average widths herein specified. No cross-aisle shall be less than 3 feet-6 inches wide. An aisle bordering on a means of entrance shall be not less than 4 feet wide.

In all balconies and galleries having more than 20 rows of seats, there shall be provided a cross-aisle not less than 4 feet wide leading directly to an exit.

There shall be no obstructions of any kind in any aisle. Aisles shall not have a slope of more than one in ten except that the maximum gradient in aisles on the main auditorium floor shall not exceed one in five. Ramps steeper than one in eight shall have non-slip surface.

Rows of seats between aisles shall have not more than 14 seats.

Rows of seats opening on to an aisle at one end only shall have not more than 7 seats. Seats without dividing arms shall have their capacity determined by allowing 18 inches per person.

Exits and aisles shall be so located that the travel distance to an exit door shall not be greater than 100 feet measured along the line of travel.

Steps shall not be used in aisles of the main auditorium floor, or in other aisles, where differences of level can be overcome by gradients not exceeding those permitted herein. Where steps are used in aisles, such steps shall extend across the full width of aisles and shall be illuminated; treads and risers shall be as required elsewhere in the Code for exit stairs. No isolated steps shall be permitted nor shall the aggregate rise of a group of steps exceed 21 inches.

In places of assembly used regularly for theatrical or similar performances, or for the display of motion pictures, the seats shall be securely fastened to the floor. All other Group E, Assembly occupancies seating more than 200 persons shall have seats fastened to the floor. All seats in balconies or galleries shall be secured to the floor except that in railed-in enclosures, boxes, or loges, with level floors and having no more than 14 seats, the seats need not be fastened to the floor, or have separating arms.

The spacing of rows of seats from back to back shall be not less than 30 inches, and not less than 27 inches plus the sum of the thickness of the back and the inclination of that back; but in all cases there shall be a space of not less than 12 inches between the back of one seat and the front of the seat immediately behind it as measured between plumb lines.

512.13 — RAILINGS

The facia of boxes, balconies and galleries shall have substantial railings not less than 26 inches high above the floor. The railing at the ends of aisles extending to the facia shall be not less than 30

inches high for the width of the aisle, or 36 inches high if at foot of steps.

Cross-aisles, except where the backs of seats on the front of the aisle project 24 inches or more above the floor of the aisles, shall be provided with railings not less than 26 inches high.

In balconies, galleries, or other locations where seats are arranged on platforms or successive tiers, and the height of the rise from one platform to another exceeds 21 inches, a substantial railing of not less than 30 inches high shall be placed at the edge of the platform along the entire row of seats.

512.14 — STAIR CONSTRUCTION

Stairs in all buildings of Group E, Assembly occupancy over two stories in height shall be of non-combustible construction, meeting the requirements of Section 1108 and shall conform with all the exit requirements.

512.15 — EXIT DOORS

Doors and gates shall conform to the requirements of Section 1110, Doorways; and Section 1105.3, Doorways and Horizontal Exits.

512.16 — EXIT LIGHTS

All exits shall be marked with illuminated signs bearing the word "EXIT" in letters at least six inches high. Where electric current is the source of lighting of the building, each sign shall be provided with two separate electric light globes on separate circuits, one such circuit being separate from any other circuit in the building. All exit signs shall be illuminated at all times when the building is occupied, by a reliable light source of not less than 25 watts or equivalent photometric rating that will be readable easily at a distance of 100 feet.

512.17 — PLACARD INDICATING CAPACITY

A placard indicating the allowable maximum legal capacity of every Group E, Assembly occupancy, in number of occupants other than employees, shall be displayed in a prominent place. Such signs shall read as follows:

"Occupancy by more than _____ persons is dangerous and unlawful."

_____Building Official

512.18 — EXIT OBSTRUCTIONS

No obstruction shall be placed in any aisle, exit, foyer, passageway or corridor.

Where the floor space of a Group E, Assembly occupancy, is occupied by tables, chairs, or other movable furniture, aisles at least 36 inches in clear width shall be maintained to provide ready access to exit doorways.

512.19 — CONSTRUCTION OF STAGE, PROSCENIUM AND APPURTENANT ROOMS

Any working stage (see definition) shall be enclosed on all sides with walls having a fire-resistance of not less than four hours and extending from foundation to a height of four feet above roof.

There shall be no openings in the wall separating the stage from the auditorium except the stage or proscenium opening, one doorway at each side of the proscenium opening at the stage floor level, at the level of the musicians pit, and where necessary to the organ. Each such doorway shall be not more than 21 square feet in area and shall be protected by an automatic fire door on one side of the wall and a self-closing fire door on the other side of the wall. Door openings leading from the stage to the outer air shall be equipped with approved self-closing fire doors.

There shall be no windows in such enclosure walls within 5 feet of property line other than a street line, and all windows shall be of approved fire-resistive type.

All mouldings and decorations around proscenium opening shall be constructed entirely of non-combustible or fire-resistant materials.

Above the proscenium opening shall be a girder or other structural member of adequate strength to support all loads, constructed of non-combustible material and protected to provide not less than 4-hour fire-resistance.

All that portion of the stage except that used for the working of scenery, traps and other mechanical apparatus for the presentation of a scene, approximately equal to the width of the proscenium opening, shall be of Type I Fireproof construction, and all appurtenant rooms and compartments shall be of Type I Fireproof or Type II Fire-Resistive construction.

The rigging loft, fly galleries, including pin-rails, shall be of non-combustible materials.

The roof over the stage shall be of Type I Fireproof construction.

Dressing rooms, scene docks, property rooms, workshops, storerooms, and other rooms or compartments appurtenant to the stage shall be of Type I Fireproof or Type II Fire-Resistive construction and shall be separated from the stage and other parts of the building by walls having a fire-resistance rating of not less than 3-hours. Such rooms and spaces shall be separated from each other by non-combustible partitions providing not less than 2-hours fire-resistance, except that partitions separating dressing rooms from each other shall have at least 1-hour fire-resistance. In no case shall openings other than the necessary doorways at stage level, protected with self-closing fire doors, connect such rooms with the stage.

Openings through stage floors shall be equipped with tight-fitting trap doors of wood not less than 2 inches thick.

The troughs or frames for footlights and border lights shall be of metal or other non-combustible materials. The suspension lines of border lights shall be of wire for at least 10 feet from the frames.

All electrical equipment shall be protected from falling objects and from contact with stage equipment, and shall conform with the City electrical requirements.

All woodwork and all scenery, drapes, and sets used upon the stage shall be coated or treated by approved method to make them non-flammable or fire-resistive.

All shelving, closets, etc., property rooms, or storage rooms, shall be constructed of metal or other non-combustible material.

512.20 — VENTILATION OF STAGE

Over the stage shall be provided one or more ventilators of metal or other non-combustible material, equipped with movable shutters or sash, having an aggregate clear area of not less than one-eighth the area of the stage, constructed to open automatically and instantly by approved heat-actuated devices. Suitable means for manual operation shall be provided in addition. If glass is used in the construction, only wired glass shall be used in such parts where the breaking of glass would cause it to fall on the stage.

512.21 — PROSCENIUM CURTAIN

Every proscenium opening shall be provided with a curtain of metal or other non-combustible material, so designed and constructed that for at least thirty minutes it will prevent all passage of flame and withstand without failure a temperature of not less than 1700 degrees F. and an air pressure normal to its surface of not less than 10 lbs. per square foot. When closed, proscenium curtain shall be reasonably tight against the passage of smoke. The Building Official may require a fire test or other satisfactory evidence of its sufficiency in respect to these requirements. Curtain shall be subjected to operating tests and be approved by the Building Official before initial performance shall be held and shall be lowered after every performance.

Every proscenium curtain shall overlap the proscenium opening by at least 2 feet at the top and 18 inches at each side, and shall slide vertically at each side within iron or steel grooves which shall have a minimum depth of 12 inches. Every such curtain shall be so arranged and maintained that, in case of fire, it would be released automatically and instantly by an approved heat-actuated device, and will descend slowly and safely by its own weight to completely close the proscenium opening within 30 seconds, taking not over 5 seconds for the bottom 5 feet. It shall also be equipped with effective devices to permit prompt and immediate closing of the proscenium opening by manual means.

No part of any proscenium curtain shall be supported by or fastened to combustible material.

512.22 — STAGE AND DRESSING ROOM EXITS

Not less than one exit to a street, exit court, or passageway to a street, 3 feet or more in width, shall be provided from each side of the stage of every Group E-1, Large Assembly Place, and from each side of the sub-stage or basement or cellar under the stage, and an exit not less than 30 inches wide shall be provided from each fly-gallery and from the gridiron. An iron ladder shall be provided leading from the gridiron to a scuttle in the stage roof; such scuttle shall be not less than 2 feet x 3 feet in size and shall be provided with a metal-covered or non-combustible trap door. Each tier of dressing rooms shall be provided with at least two means of egress, each not less than 2 feet-6 inches wide, one of which shall lead directly into an exit court or street. All exit stairs shall be constructed of non-combustible material as prescribed in Section 1108, Stair Construction. Stair exits from stage and dressing rooms need not be enclosed.

512.23 — SPRINKLERS

Every theater classified as a Group E-1, Large Assembly Place, shall have an approved system of automatic sprinklers conforming with Section 901 over the stage, in toilet rooms, lounges, smoking rooms, and all other parts including basements, cellars, property rooms, dressing rooms, storerooms, workshops, and all portions of stage and rooms under the stage floor level except as noted below.

Sprinklers shall not be placed in the auditorium, foyers, lobbies, or over dynamos or switchboards without proper protection, or in the immediate vicinity of automatic stage ventilators.

512.24 — STANDPIPES

In Group E, Assembly occupancies, a standpipe outlet with hose attachment shall be provided on each side of the rear of the place of assembly, on each side of the rear of each balcony and gallery, on each side of the stage, on each tier of dressing rooms, and within 50 feet of all property rooms, storerooms and workrooms. Such outlets shall connect with a standpipe which shall conform to the requirements of Section 902.1, but which shall have a diameter of not less than 4 inches except that standpipes on each side of the stage shall be of diameter not less than 2½ inches.

512.25 (a) — INDOOR MOTION PICTURE PROJECTION BOOTHS

Every motion picture projector using flammable films, together with all electrical devices, rheostats, and other film equipment, and all films shall be enclosed in a booth constructed as specified herein.

The floor of such booths shall be of masonry or concrete not less than 2 inches thick, and the walls and ceiling shall be of non-combustible construction providing not less than 1-hour fire-resistance with all joints sufficiently tight to prevent the discharge of smoke.

The size of the projection booth shall depend upon the equipment and apparatus to be placed therein. In general, there shall be at least 30 inches of clear space to the right and rear of each projector with ample space about spot lights and other devices for normal operation. For a single projector without sound equipment, the booth shall in no case be less than 8 feet wide, 10 feet deep and 8 feet high; where two projectors with sound equipment are used, the minimum size of booths shall be increased to 16 feet wide and 12 feet deep.

Storage batteries shall be located in a separate compartment provided with an acid-resisting, metal ventilating duct leading to outdoors. Motor generators shall also be located in a separate compartment. These compartments shall be of construction as specified for projection booths.

The projection enclosure or booth shall have not less than two exit doors each not less than 30 inches or more than 32 inches wide and 6 to 7 feet high, protected by approved self-closing fire doors. Top of openings shall be at least 1 foot below booth ceiling.

Openings for projectors shall be no larger than necessary, and for the projectionist's view shall in no case exceed 10 inches in any dimension. Such openings shall be provided with automatic metal shutters and shall conform to the Standards of the National Board of Fire Underwriters for Storage and Handling of Cellulose Nitrate Motion Picture Film, Pamphlet No. 40 dated November, 1953.

All shelves, racks, furniture, and fixtures within the booth shall be of metal or non-combustible material. No combustible material shall be allowed within the booth except the films and cement used in the operation of the machine. Every motion picture machine shall be securely fastened to the floor.

Metal cabinets or boxes with tight self-closing doors, each with a capacity not in excess of 10 reels of film, with individual compartments for each reel, shall be provided to store films not in use; no solder shall be used in the construction of such cabinets and boxes.

Ventilation shall be provided by one or more mechanical exhaust systems which shall draw air from each arc lamp housing and from one or more points near the ceiling. Systems shall exhaust to outdoors either directly or through a non-combustible flue used for no other purpose. Exhaust capacity shall be not less than 15 cubic feet nor more than 50 cubic feet per minute for each arc lamp, plus 200 cubic feet per minute for the room itself. For a booth containing two projectors, the exhaust flue shall be not less than 18 inches in diameter or equivalent size. Systems shall be controlled from within the enclosure and have pilot lights to indicate operation. The exhaust system serving the projection room may be extended to cover rooms associated therewith, such as rewind rooms. No dampers shall be installed in such exhaust systems. Ventilation of these rooms shall not be connected in any way with ventilating or air conditioning systems serving other portions of the building.

Exhaust ducts shall be of non-combustible material, and shall either be kept 1 inch from combustible material or covered with ½ inch of approved, non-combustible, heat insulating material.

Fresh air intakes other than those direct to the open air shall be protected by approved fire shutters arranged to operate automatically with the port shutters.

Provisions shall be made so that the auditorium lights can be turned on from inside the projection booth and from at least one other convenient point in the building.

512.25 (b) — OUTDOOR MOTION PICTURE PROJECTION BOOTHS

Every motion picture projector, films or equipment shall be enclosed in a booth of not less than non-combustible construction throughout. Flammable films shall be kept in separate metal containers, stored in metal cabinets tightly closed. Every such booth shall have two exits or exitways located as remotely from each other as possible.

512.26 — REWINDING OF FILM

All rewinding of film shall be done either in a projection booth, or in a room enclosure constructed to meet the fire-resistance requirements prescribed for film projection booths. If done in projection room, approved enclosed type rewind machines shall be used and an approved can with self-enclosing hinged cover shall be provided for scrap film.

512.27 — SUPPLEMENTARY LIGHTING SYSTEM

There shall be installed in every Group E-1, Large Assembly Places, a supplementary lighting system, in addition to the regular system furnished by local electrical power; such supplementary system shall comprise storage batteries, or equivalent emergency systems, of sufficient power to augment the regular lighting system, in case of failure in emergency. There shall be two switches provided for the purpose of turning on such supplementary lighting system, one switch located in the projection booth and one located and properly protected on the outside of the building; all such turn on switches shall be plainly marked as such. Every supplementary lighting system shall be maintained in good working order and shall be tested at least once every ten days.

SECTION 513 — BOWLING ALLEYS

513.1 — GENERAL

Bowling alleys shall have at least two separate exits and shall comply with the exit requirements specified in Section 512.8.

Where bowling pin finishing or refinishing operations are carried on, such a separate building, or a separate room, constructed as specified herein, shall be provided.

Such a room shall be located at or above street level and shall have one or more windows opening to the outside of the building.

Walls and ceiling of such rooms shall be of not less than one-hour fire-resistive construction. Floors shall be of concrete at least two inches thick or of equivalent non-combustible protective material.

Door openings shall be provided with non-combustible sills, raised six inches above floor level and protected with approved fire doors.

513.2 — PIN FINISHING ROOMS

Shelving, containers, and all furnishings shall be of non-combustible material. Machinery shall be effectively grounded. (See Section 501.1 (f).)

Ventilation sufficient to effect complete change of air at least once every three minutes shall be provided.

SECTION 514 — CHURCHES

514.1 — SCOPE

This section shall apply to churches or places of worship. All other places of public assembly shall be governed by the regulations as set forth in Section 512.

514.2 — TYPES OF CONSTRUCTION

Churches of Group E-1 Large Assembly shall be of Type I or II construction. Churches in Group E-2 Small Assembly shall be of Type I, II, III, IV, V, or VI construction and shall come within the limitations of use prescribed in Section 408.6.

514.3 — INTERIOR FINISH AND DECORATIONS

All interior finishes and decorations shall conform with Section 512.2 except that nothing in this Section shall prevent the use of wood for ornamental purposes, trusses, paneling or chancel furnishing.

514.4 — MAIN ENTRANCE DOORWAYS

In no case shall the minimum aggregate width of the main entrance doorways be less than six feet, with an increase of 20 inches for each 100 persons over 300. Main entrance doorways shall be in addition to the required emergency exit doorways as set forth in Section 514.5.

514.5 — EXITS, GENERAL

Exit openings shall be in addition to main entrances. Exits shall open directly upon a street, exit courts or public space. No corridor shall be less in width than the largest door opening into it, plus one-half the sum of the widths of all other doorways. There shall be no openings other than exits in such corridors.

GROUP E-1 — LARGE ASSEMBLY

No group E-1 Large Assembly church shall have less than three exitways on the main floor except where more than 1,000 people are accommodated in which case there shall be not less than four exitways. Exitways shall be so located that the maximum distance of travel to any exitway shall be not more than one hundred feet and they shall be located as remotely as possible from one another.

GROUP E-2 — SMALL ASSEMBLY

In every Group E-2 Small Assembly church there shall be not less than two exits, serving the main floor located as remotely as practicable from one another. In no case shall the maximum distance of travel to an exit be greater than one hundred feet.

514.6 — AGGREGATE CLEAR WIDTH OF EXITWAYS

The aggregate clear width of all exitways shall be not less than 22 inches for each one hundred persons expected to occupy such building; except that in no case shall an exit be less in width than the full width of the aisle or aisles leading thereto.

514.7 — EXIT DOORWAYS

Group E-1—Every exit doorway shall have minimum clear width of not less than five feet nor in any case less in clear width than the exit or exitway it serves.

Group E-2—Every exit doorway shall have minimum clear width of not less than three feet nor in any case less in clear width than the exit or exitway it serves.

Exit doorways shall open outward and in no case shall any doorway be hung so as to decrease the required width of a passageway.

514.8 — AISLES AND SEATING

Every aisle shall lead to an exit door or to a cross aisle running parallel to the seats and leading directly to an exit. No aisle shall be less in width than 36 inches plus an increase of 1½ inches for each five feet of such aisle from its beginning to an exit, except that aisles with seats on one side may be six inches less in width; where egress is provided at both ends of an aisle, the aisle may have a uniform width of not less than specified herein. No cross aisle shall be less than 3 feet 6 inches. An aisle bordering on a means of entrance shall be not less than 4 feet wide.

There shall be no obstructions of any kind in an aisle. Aisles shall not exceed a gradient of more than one in eight. No steps shall be used in any aisle where differences of level can be overcome by gradients. Where it is necessary in balconies to use steps, they shall extend the full width of aisles and risers shall not exceed six and one-half inches.

Rows of seats between aisles shall have not more than 20 seats. Rows of seats OPENING onto an aisle at one end shall have not more than 7 seats. Seats without dividing arms shall have their capacity determined by allowing 18 inches per person.

The spacing of rows of seats from back to back shall be not less than 30 inches. In every case there shall be a clear space of not less than 12 inches between the back of one seat and the front of one seat immediately behind it, measured at the seat line.

514.9 — STAIR CONSTRUCTION

The construction of Stairways shall conform to the requirements of Section 1108.

514.10 — BALCONY ENTRANCES AND EXITS

For balconies of church occupancies having a seating capacity of over 75, at least two stairways shall be provided in accordance with the following:

(a) For seating capacity of less than 125, the stairs may be unenclosed.

(b) For seating capacity of 125 to 200 the stairs shall be enclosed between the floor and ceiling of either the main floor or the balcony and shall exit to the outside or into a public lobby or foyer.

(c) For seating capacity of more than 200, exits shall be provided in accordance with Section 512.10—Balcony and Gallery Entrances and Exits.

CHAPTER VI

CLASSIFICATION OF BUILDINGS BY CONSTRUCTION

SECTION 601 — CLASSIFICATION BY TYPE OF CONSTRUCTION

601.1 — TYPES

All buildings shall be classified into six general types according to the character of materials employed and their method of assembly, as follows:

TYPE I — FIREPROOF

TYPE II — FIRE-RESISTIVE

TYPE III — HEAVY TIMBER

TYPE IV — NON-COMBUSTIBLE FRAME

TYPE V — ORDINARY

TYPE VI — WOOD FRAME

601.2 — FIRE-RESISTIVE REQUIREMENTS

All fire-resistive requirements are expressed in terms of the number of hours of satisfactory performance in accordance with the "Standard Methods of Fire Tests of Building Construction and Materials of the American Society for Testing Materials". (ASTM Designation E119-58.)

601.3 — MATERIALS AND CONSTRUCTION APPROVED FOR FIRE PROTECTION

The degree of fire resistance and the materials, assemblies, and constructions providing such resistance shall be as defined in Chapter X of this Code, except that other materials, assemblies, and constructions shall be approved, provided test data of a recognized engineering or testing laboratory are submitted, establishing that they develop the required fire-resistance ratings under tests made in accordance with the Standard Methods of Fire Tests of Building Construction and Materials, (ASTM Designation E119-58 of the American Society for Testing Materials.)

Where structural requirements necessitate assemblies providing greater fire resistance than specified in this Chapter, such structural requirements shall govern.

SECTION 602 — TYPE I — FIREPROOF CONSTRUCTION

602.1 — GENERAL

Type I, Fireproof construction, is that in which all exterior walls are of masonry or reinforced concrete, or of other approved materials or combination of materials, and in which all the structural members are of non-combustible materials, and provide Fire-Resistance not less than specified in this Section.

602.2 — FIRE DISTRICTS — SECTION 301

602.3 — ALLOWABLE HEIGHT — SECTIONS 404 to 411, inclusive

602.4 — ALLOWABLE AREA — SECTIONS 404 to 411, inclusive

602.5 — FIRE PROTECTIVE REQUIREMENTS — TYPE I, FIREPROOF

TABLE 602.5 — FIRE PROTECTIVE REQUIREMENTS, TYPE I, FIREPROOF

Structural Members	Required Fire Resistance (Hours)	
WALLS		
Party Walls	4	Party and fire walls shall extend not less than three (3) feet above the roof, except that fire walls need not extend above the roof where the roof is of non-combustible construction for the area within forty (40) feet of each side of the wall.
Fire Walls	4	
Exterior Bearing	4	All walls except:
	3	Where wall faces on street or public place thirty (30) feet or more in width.
	2	Where wall faces on street or public place fifty (50) feet or more in width.
Exterior Non-Bearing (See Section 610)	2	All walls except:
	1	Where protection of wall openings is not required by Section 703.
Inner Court	3	All walls except:
Penthouse	2	Where penthouse walls set back five (5) feet or more from exterior walls. Where set back is

TABLE 602.5 — FIRE PROTECTIVE REQUIREMENTS TYPE I, FIREPROOF (Continued)

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
Inner Court Penthouse (Continued)		less than five (5) feet, penthouse walls shall conform to fire-resistance ratings for exterior walls.
PARTITIONS		
Interior Bearing	4	Enclosure for vertical openings—Sect. 701. Buildings with mixed occupancies — Sect. 412. All other partitions—Sect. 702.
Interior Non-Bearing		
COLUMNS		
Supporting Masonry or Bearing Walls	4	
Supporting Roofs only	3	
Other Columns	4	
TRUSSES		
Supporting Masonry or Bearing Walls, Columns, Girders Trusses	4	
Supporting Roofs only	2	
	1*	
Other Trusses	2½	See Footnote
GIRDERS		
Supporting Masonry or Bearing Walls, Columns, Girders Trusses	4	
Supporting Roofs only	2	
	1*	
Other Girders	2½	See Footnote
BEAMS		
Supporting Masonry or Bearing Walls Columns, Girders, Trusses	4	
Supporting Roofs only	1½	
	1*	
Other Beams	2½	See Footnote

TABLE 602.5 — FIRE PROTECTIVE REQUIREMENTS, TYPE I, FIREPROOF (Continued)

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
FLOORS		
Deck Construction	2½	
ROOFS		
Deck Construction	1½	
High above floor	1*	See Footnote

NOTE: *In buildings of Group C and E (School and Assembly) occupancies, where structural steel members supporting a roof only are not less than eighteen (18) feet clear above any floor or balcony, one (1) hour fire-resistance shall be provided; where clear distance is twenty-five (25) feet or more fire protection of structural steel members supporting roof construction only may be omitted.

PROTECTION OF WALL OPENINGS ..... Section 703

FIRESTOPPING ..... Section 705

STAIRWAY CONSTRUCTION ..... Section 1108

ROOF COVERINGS ..... Sections 301 and 706

REGULATIONS GOVERNING EXTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Gutters and Leaders ..... Section 711
b. Dormer Windows ..... Section 709
c. Towers, Spires and Cupolas ..... Section 712
d. Cooling Towers ..... Section 714
e. Tanks ..... Section 713
f. Skylights ..... Section 707

REGULATIONS GOVERNING INTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Floor Finish ..... Section 704.2
b. Ceilings ..... Section 704.3
c. Other Interior Finishes ..... Section 704.4

SECTION 602.6 — STRUCTURAL AND ENGINEERING REQUIREMENTS

a. Minimum Design Loads .....Chapter XII

b. Foundations .....Chapter XIII

c. Steel .....Chapter XV

d. Concrete .....Chapter XVI

e. Masonry and Veneered Walls .....Chapter XIV
(Partitions and Walls)

f. Lathing and Plastering .....Chapter XVIII

g. Stair Construction .....Section 1108

h. Elevators and Escalators .....Chapter XXIV

i. Safeguards During Erection .....Chapter XXI

SECTION 603 — TYPE II — FIRE-RESISTIVE CONSTRUCTION

603.1 — GENERAL

Type II—Fire-Resistive construction is that in which all exterior walls are of masonry or reinforced concrete, or of other approved materials or combinations of materials and in which all the structural members are of non-combustible materials, and provide fire-resistance not less than specified in this section.

603.2 — FIRE DISTRICTS — SECTION 301

603.3 — ALLOWABLE HEIGHT — SECTIONS 404 to 411, inclusive

603.4 — ALLOWABLE AREA — SECTIONS 404 to 411, inclusive

603.5 — FIRE PROTECTIVE REQUIREMENTS — TYPE II — FIRE-RESISTIVE

TABLE 603.5 — FIRE PROTECTIVE REQUIREMENTS, TYPE II — FIRE-RESISTIVE

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
WALLS		
Party Walls	4	Party and fire walls shall extend not less than three (3) feet above the roof, except that fire-walls need not extend above the roof where the roof is of non-combustible construction for the area within forty (40) feet of each side of the wall.
Fire Walls	4	
Exterior Bearing	3**	See Footnote
	2	Where wall faces on street or public place thirty (30) feet or more in width.
Exterior Non-Bearing (See Section 610)	2	All walls except:
	1	Where protection of wall openings is not required by Section 703.
Inner Court	2	
Penthouse	2	Where penthouse walls set back five (5) feet or more from exterior walls. Where set back is less than five (5) feet, penthouse walls shall conform to fire-resistive ratings for exterior walls.

TABLE 603.5 — FIRE PROTECTIVE REQUIREMENTS TYPE II — FIRE-RESISTIVE (Cont'd)

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
PARTITIONS		
Interior Bearing	3	Enclosure for vertical openings—Sect. 701. Buildings with mixed occupancies—Sect. 412. All other partitions—Sect. 702.
Interior Non-Bearing		
COLUMNS		
Supporting Masonry or Bearing Walls	3	
Supporting Roofs only	2	
Other Columns	2	
TRUSSES		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	3	
Supporting Roofs only	1*	See Footnote
Other Trusses	1½	
GIRDERS		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	3	
Supporting Roofs only	1*	See Footnote
Other Girders	1½	
BEAMS		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	3	
Supporting Roofs only	1*	See Footnote
Other Beams	1½	
FLOORS		
Deck Construction	1½	
ROOFS		
Deck Construction	1	
High above Floor	0*	See Footnote

TABLE 603.5 — FIRE PROTECTIVE REQUIREMENTS, TYPE II, FIRE-RESISTIVE (Continued)

NOTE: *Fireproofing of structural steel members may be omitted in buildings of Group C and E (School and Assembly) occupancies where steel structural members support a roof only and are twenty (20) feet or more clear above any floor or balcony.

**Exterior walls of Type II buildings not over three (3) stories in height of Group A, B, C, D or E occupancy may be constructed of framed wall assemblies, that have fire resistance against outside exposure, as specified in Table 603.5, and that has not less than 1½ hours fire-resistance inside the building.

PROTECTION OF WALL OPENINGS ..... Section 703
FIRESTOPPING ..... Section 705
STAIRWAY CONSTRUCTION ..... Section 1103
ROOF COVERINGS ..... Sections 301 and 706

REGULATIONS GOVERNING EXTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Gutters and Leaders ..... Section 711
b. Dormer Windows ..... Section 709
c. Towers, Spires and Cupolas ..... Section 712
d. Cooling Towers ..... Section 714
e. Tanks ..... Section 713
f. Skylights ..... Section 707

REGULATIONS GOVERNING INTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Floor finish ..... Section 704.2
b. Ceilings ..... Section 704.3
c. Other Interior Finishes ..... Section 704.4

SECTION 603.6 — STRUCTURAL AND ENGINEERING REQUIREMENTS

a. Minimum Design Loads ..... Chapter XII
b. Foundations ..... Chapter XIII
c. Steel ..... Chapter XV
d. Concrete ..... Chapter XVI
e. Masonry and Veneered Walls ..... Chapter XIV (Partitions and Walls)
f. Lathing and Plastering ..... Chapter XVIII
g. Stair Construction ..... Section 1108
h. Elevators and Escalators ..... Chapter XXIV
i. Safeguards During Erection ..... Chapter XXI

SECTION 604 — TYPE III — HEAVY TIMBER CONSTRUCTION

604.1 — GENERAL

Type III—Heavy Timber construction is that in which all exterior walls are of masonry or reinforced concrete, or of other approved materials or combinations of materials that provide fire-resistance not less than required in this Section, and in which all the structural members are of heavy timber, of sizes not less than indicated in this Section, or are in part of protected steel or reinforced concrete of fire-resistance not less than required in Table 604.5. There shall be no concealed spaces within the combustible member of heavy timber construction; such spaces may occur only within the required protection of incombustible members.

604.2 — FIRE DISTRICTS — SECTION 301

604.3 — ALLOWABLE HEIGHT — SECTIONS 404 to 411, inclusive

604.4 — ALLOWABLE AREA — SECTIONS 404 to 411, inclusive

604.5 — FIRE PROTECTIVE REQUIREMENTS — TYPE III — HEAVY TIMBER

TABLE 604.5 — FIRE PROTECTIVE REQUIREMENTS— TYPE III — HEAVY TIMBER

Structural Members	Required Fire Resistance (Hours)	
WALLS See Note (1)	4	See Note (1) for parapet requirements.
Party Walls	4	
Fire Walls	4	
Exterior Bearing Walls	4	All walls except:
	3	Where wall faces on street or public place thirty (30) feet or more in width.
Exterior Non-Bearing Walls (See Section 610)	3	All walls except:
	2	Where wall faces on street or public place fifty (50) feet or more in width.
Inner Court Walls	3	
Penthouse	2	Where penthouse wall set back five (5) feet or more from exterior walls. Where set back is

TABLE 604.5 — FIRE PROTECTIVE REQUIREMENTS— TYPE III — HEAVY TIMBER (Continued)

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
Inner Court Walls Penthouse (Continued)		less than five (5) feet, penthouse walls shall conform to fire-resistive ratings of exterior walls.
PARTITIONS		Enclosure for vertical openings — Sect. 701. Buildings with mixed occupancies — Sect. 412. All other partitions — Sect. 702.
Interior Bearing	3	
Interior Non-Bearing		
COLUMNS		
Supporting Masonry or Bearing Walls	2	Columns shall be provided with metal or reinforced concrete caps.
Supporting Roofs only	8" x 8" or 1 Hr.	
Other Columns	8" x 8" or 1 Hr.	
TRUSSES		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	2	See Note (4).
Supporting Roofs only	4" x 6" or 1 Hr.	
Other Trusses	6" x 6" or 1 Hr.	
GIRDERS		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses,	2	Where Girders or Beams rest on walls, plates, boxes of the self releasing type or hangers shall be provided.
Supporting Roofs only	6" x 8" or 1 Hr.*	
Other Girders	6" x 10" or 1 Hr.	

TABLE 604.5 — FIRE PROTECTIVE REQUIREMENTS— TYPE III — HEAVY TIMBER (Continued)

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
BEAMS		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	2	
Supporting Roofs only	6" x 6" or 1 Hr.*	
Other Beams	6" x 8" or 1 Hr.	
FLOORS See Note (2)		
Deck Construction		See Note (2).
ROOFS See Note (3)		
Deck Construction High above Floor	*	See Note (3).

NOTE: *For buildings of Group C and E (School and Assembly) occupancies where steel structural members supporting a roof only and are twenty (20) feet or more clear above any floor or balcony, non-combustible construction unprotected may be used.

In all Group D (Institutional); and in Group C (Schools) two or more stories in height; at least one-hour interior fire-resistive construction shall be used throughout.

NOTE (1) All exterior walls within fifty (50) feet of adjacent property lines and all walls within fifty (50) feet of other buildings shall be provided with a parapet wall at least three (3) feet high above the roof except that parapet walls need not be constructed on buildings where the roof slopes more than four (4) inches vertical to twelve (12) inches horizontal from the back of the exterior wall of such building.

Parapets at least three (3) feet high above the roof shall be provided on all fire walls and party walls regardless of roof slope.

NOTE (2) Wood floors shall be of at least three (3) inch nominal thickness splined or tongue and grooved planks or four (4) inch of laminated planking laid on edge, with a top layer of flooring one (1) inch nominal thickness.

TABLE 604.5 — FIRE PROTECTIVE REQUIREMENTS— TYPE III — HEAVY TIMBER (Continued)

All timbers and planking shall be self-releasing at end support on walls. A space of at least one-half (½) inch between floor construction and wall shall be provided to allow for swelling; such space shall be covered to prevent passage of heat or flame. Concealed air spaces in such construction shall not be permitted.

Other types of floors shall be of non-combustible construction providing not less than one (1) hour fire-resistance.

NOTE (3) **ROOF CONSTRUCTION**—Roofs shall be as specified for floor construction except that minimum allowable thickness of wood plank roofs shall be not less than two (2) inches nominal and except that non-combustible construction may be used, and further, provided that any material manufactured for roof sheathing which is no less than two (2) inches nominal thickness and no more combustible than two (2) inch nominal wood sheathing, may be used within spans which have been proved structurally safe by approved tests.

Attic spaces shall be divided into areas not exceeding two thousand five hundred (2,500) square feet by non-combustible partitions, unless roof and attic are of non-combustible construction or unless an approved sprinkler system is installed in the attic space.

NOTE (4) **TIMBER ARCHES AND TRUSSES** — Timber arches or trusses may be used to support roof loads. The framing members shall be not less than four by six inches nominal dimensions, except that spaced members may be composed of two or more pieces not less than three inches nominal in thickness when blocked solidly throughout their intervening spaces or when such spaces are tightly closed by a continuous wood cover plate of not less than two inches nominal thickness secured to the underside of the members. Splice scabs shall not be less than three inches nominal thickness. When protected by approved automatic sprinklers under the roof deck, the framing members may be reduced to not less than three inches nominal thickness.

TABLE 604.5 — FIRE PROTECTIVE REQUIREMENTS— TYPE III — HEAVY TIMBER (Continued)

PROTECTION OF WALL OPENINGS ..... Section 703

FIRESTOPPING ..... Section 705

STAIRWAY CONSTRUCTION ..... Section 1108

ROOF COVERINGS ..... Sections 301 and 706

REGULATIONS GOVERNING EXTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Gutters and Leaders ..... Section 711

b. Dormer Windows ..... Section 709

c. Towers, Spires and Cupolas ..... Section 712

d. Cooling Towers ..... Section 714

e. Tanks ..... Section 713

f. Skylights ..... Section 707

REGULATIONS GOVERNING INTERIOR USE OF COMBUSTIBLE MATERIALS:

a. In Group H, Special Hazardous Occupancies, only non-combustible finishes shall be used.

b. For Group E, Assembly Occupancies, see Section 512.2.

c. For other occupancies, see Section 704.

SECTION 604.6 — STRUCTURAL AND ENGINEERING REQUIREMENTS:

a. Minimum Design Loads ..... Chapter XII

b. Foundations ..... Chapter XIII

c. Wood ..... Chapter XVII

d. Steel ..... Chapter XV

e. Concrete ..... Chapter XVI

f. Masonry and Veneered Walls (Partitions and Walls) ..... Chapter XIV

g. Lathing and Plastering ..... Chapter XVIII

h. Stair Construction ..... Section 1108

i. Elevators and Escalators ..... Chapter XXIV

j. Safeguards During Erection ..... Chapter XXI

SECTION 605 — TYPE IV — NON-COMBUSTIBLE CONSTRUCTION

605.1 — GENERAL

Type IV, Non-Combustible Construction, is that in which all structural members, including wall framing, floors, roofs and their supports, shall be of steel, iron or other metal, or of other non-combustible materials, and in which the exterior surface of the building is of steel, iron or other metal, or of asbestos, masonry, reinforced concrete, or other non-combustible materials, and that are fire-protected only where specified in this Section.

605.2 — FIRE DISTRICTS — SECTION 301

605.3 — ALLOWABLE HEIGHT — SECTIONS 404 to 411, inclusive

605.4 — ALLOWABLE AREA — SECTIONS 404 to 411, inclusive

605.5 — FIRE-PROTECTIVE REQUIREMENTS — TYPE IV — NON-COMBUSTIBLE

TABLE 605.5 — FIRE-PROTECTIVE REQUIREMENTS— TYPE IV — NON-COMBUSTIBLE

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
WALLS		
Party Walls	4	Party and fire walls shall extend not less than three (3) feet above the roof, except that fire walls need not extend above the roof where the roof is of non-combustible construction of the area within forty (40) feet of each side of the wall.
Fire Walls	4	
Exterior Walls (See Section 610)	2***	For buildings more than one-story in height or exceeding 2,000 sq. ft. in area located in the First Fire District, except as in Section 610.
	2***	For one-story buildings not exceeding 2,000 sq. ft. in area when the exterior wall is facing and located within 15 ft. of common property or interior lot lines in the First Fire District.
	1***	For buildings more than one-story in height or exceeding 2,000 sq. ft. in area located in the Second Fire District when the exterior wall is facing and located within 15 ft. of common property or interior lot lines.
	1***	For buildings more than one-story in height or exceeding 2,000 sq. ft. in area located outside of the Fire Districts, when the exterior wall is facing and located within 8 ft. of common-property or interior lot lines.

TABLE 605.5 — (Continued)

Exterior Walls (See Section 610)	1***	For one-story buildings not exceeding 2,000 sq. ft. in area when the exterior wall is facing and located within 8 ft. of common-property or interior lot lines in the Second Fire District and outside the Fire Districts.
	N.C.*	For one-story buildings not exceeding 2,000 sq. ft. in area when the exterior wall is facing and located 15 ft. or more from common-property or interior lot lines in the First Fire District; or 8 ft. or more in the Second Fire District.
	N.C.*	Except as prescribed above and except where fire protection is required by Footnote* all exterior walls may be of unprotected non-combustible construction.
Inner Court Walls	N.C.*	Same as Exterior Walls.
Penthouse Walls	N.C.	
PARTITIONS		
Interior Bearing	N.C.*	For fire-resistive requirements see Footnote*
Interior Non-Bearing		Enclosure for vertical openings—Sect. 701. Buildings with mixed occupancies—Sect. 412. All other partitions—Sect. 702.
COLUMNS		
Supporting Masonry or Bearing Walls	2**	
Supporting Roof only	N.C.	
Other Columns	N.C.*	
TRUSSES		
GIRDERS		
BEAMS		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	2**	
Other Trusses	N.C.*	
Other Girders	N.C.*	
Other Beams	N.C.*	

TABLE 605.5 — FIRE-PROTECTIVE REQUIREMENTS — TYPE IV — NON-COMBUSTIBLE FRAME (Cont'd.)

FLOORS		
Deck Construction	N.C.*	For fire-resistive requirements, see Footnote.*
ROOFS		
Deck Construction	N.C.	
High above Floor	N.C.	

ABBREVIATIONS: "N.C." means Non-Combustible.

NOTE: *In buildings over two (2) stories in height, (unless sprinklered) all walls, partitions, floors, roofs and their supporting structural members shall provide not less than one (1) hour fire-resistance within the building except that roofs of such buildings, need not be protected.

In every Group D (Institutional) building; and in Group C (Schools) two or more stories in height; at least one-hour interior fire-resistive construction shall be provided throughout the building.

**This requirement applies only to structural members supporting masonry walls, except that this does not apply in one (1) story buildings or where the only masonry supported is a masonry veneer.

***Fire-resistance against outside fire exposure.

PROTECTION OF WALL OPENINGS .....Section 703
FIRESTOPPING .....Section 705
STAIRWAY CONSTRUCTION .....Section 1108
ROOF COVERINGS .....Sections 301 and 706

REGULATIONS GOVERNING EXTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Gutters and Leaders .....Section 711
b. Dormer Windows .....Section 709
c. Towers, Spires and Cupolas .....Section 712
d. Cooling Towers .....Section 714
e. Tanks .....Section 713
f. Skylights .....Section 707

REGULATIONS GOVERNING INTERIOR USE OF COMBUSTIBLE MATERIALS:

a. In Group H, Special Hazardous Occupancy, only non-combustible finishes shall be used.

b. For Group E, Assembly Occupancies, See Section 512.2.

c. For other occupancies, See Section 704.

SECTION 605.6 — STRUCTURAL AND ENGINEERING REQUIREMENTS:

a. Minimum Design Loads .....Chapter XII

b. Foundations .....Chapter XIII

c. Steel .....Chapter XV

d. Concrete .....Chapter XVI

e. Masonry and Veneered Walls .....Chapter XIV
(Partitions and Walls)

f. Lathing and Plastering .....Chapter XVIII

g. Stair Construction .....Section 1108

h. Elevators and Escalators .....Chapter XXIV

i. Safeguards During Erection .....Chapter XXI

SECTION 606 — TYPE V — ORDINARY CONSTRUCTION

606.1 — GENERAL

Type V—Ordinary Construction—is that construction not meeting the requirements of Type III, but in which the exterior walls are of masonry or reinforced concrete or of approved materials or assembly of materials that provide fire-resistance as required in this Section, and in which the interior framing is partially or wholly of unprotected wood, or of unprotected iron or steel, except that fire protection shall be provided, as required by this Section.

606.2 — FIRE DISTRICTS — SECTION 301

606.3 — ALLOWABLE HEIGHTS — SECTIONS 404 to 411, inclusive

606.4 — ALLOWABLE AREA — SECTIONS 404 to 411, inclusive

606.5 — FIRE-PROTECTIVE REQUIREMENTS — TYPE V — ORDINARY

TABLE 606.5 — FIRE PROTECTIVE REQUIREMENTS — TYPE V — ORDINARY

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
WALLS		
Party Walls	4	Party, and fire walls shall extend not less than three (3) feet above the roof, except that fire walls need not extend above the roof where the roof is of non-combustible construction for the area within forty (40) feet of each side of the wall.
Fire Walls	4	
Exterior Bearing Walls	3	
	2	For buildings facing on a street or public place thirty (30) feet or more in width.***
Exterior Non-Bearing Walls (See Section 610)	2	
	2	For buildings located in the Fire District No. 1***.
	Non-Com.*	For buildings located outside the Fire District.***

TABLE 606.5 — FIRE PROTECTIVE REQUIREMENTS — TYPE V ORDINARY (Cont'd.)

PARTITIONS		
Interior Bearing	*	The use of combustible construction for interior bearing partitions shall be limited to the support of not more than two (2) floors and a roof.
Interior Non-Bearing	*	Enclosure for vertical openings—Sect. 701. Buildings with mixed occupancies—Sect. 412. All other partitions—Sect. 702.
COLUMNS		
Supporting Masonry or Bearing Walls		Shall be same rating as required for the wall it supports.
Supporting Roof only	*	
Other Columns	*	
TRUSSES		
GIRDERS		
BEAMS		
Supporting Masonry or Bearing Walls Columns, Girders, Trusses	2**	
Supporting Roof only	*	
Other Trusses	*	
Other Girders	*	See Footnote for fire-resistive requirements.
Other Beams	*	See Footnote for fire-resistive requirements.
FLOORS		
Deck Construction	*	See Footnote for fire-resistive requirements.
ROOFS		
Deck Construction	*	

ABBREVIATIONS: "N.C." means Non-Combustible.

NOTE (1) Buildings of Type V Construction over one story in height, except one and two family dwellings, floors located immediately above usable spaces in basements or cellars and above furnaces shall have one hour fire protection except where basement or cellar is equipped with an approved automatic sprinkler system.

*In buildings over two (2) stories in height, (unless

TABLE 606.5 — FIRE PROTECTIVE REQUIREMENTS — TYPE V ORDINARY (Cont'd.)

sprinklered) all walls, partitions, floors and their supporting structural members shall provide not less than one (1) hour fire-resistance within the building and the ceiling underneath the roof shall be the same as required for the floors.

In all Group D (Institutional) occupancies; and in Group C (Schools) two or more stories in height; at least one (1) hour interior fire-resistive construction shall be used throughout.

**This requirement applies only to structural members supporting masonry walls except that this does not apply in one story buildings or where the only masonry supported is a masonry veneer.

***Exterior wall shall extend not less than eighteen (18) inches above the roof, except that parapet walls need not be constructed on buildings where the roof slopes more than four (4) inches vertical to twelve (12) inches horizontal from the back of the exterior wall of such buildings or where the exterior wall of such building is located fifteen (15) feet or more distance from the property line or is located on one alley or public way of fifteen feet or more in width.

PROTECTION OF WALL OPENINGS ..... Section 703

FIRESTOPPING ..... Section 705

STAIRWAY CONSTRUCTION ..... Section 1108

ROOF COVERING ..... Sections 301 and 706

REGULATIONS GOVERNING EXTERIOR USE OF COMBUSTIBLE MATERIALS:

a. Gutters and Leaders ..... Section 711

b. Dormer Windows ..... Section 709

c. Towers, Spires, and Cupolas ..... Section 712

d. Cooling Towers ..... Section 714

e. Tanks ..... Section 713

f. Skylights ..... Section 707

REGULATIONS GOVERNING INTERIOR USE OF COMBUSTIBLE MATERIALS:

a. In Group H, Special Hazardous Occupancy, only non-combustible finishes shall be used.

b. For Group E, Assembly Occupancies, See Section 512.2.

c. For other occupancies, See Section 704.

SECTION 606.6 — STRUCTURAL AND ENGINEERING REQUIREMENTS

a. Minimum Design Loads .....Chapter XII

b. Foundations .....Chapter XIII

c. Wood .....Chapter XVII

d. Steel .....Chapter XV

e. Concrete .....Chapter XVI

f. Masonry and Veneered Walls .....Chapter XIV
(Partitions and Walls)

g. Lathing and Plastering .....Chapter XVIII

h. Stair Construction .....Section 1108

i. Elevators and Escalators .....Chapter XXIV

j. Safeguards During Erection .....Chapter XXI

SECTION 607 — TYPE VI — WOOD FRAME CONSTRUCTION

607.1 — GENERAL

Type VI—Wood Frame Construction—is that in which the enclosing walls are of wood or other combustible materials, including construction having exterior masonry veneer, stucco, or metal, which is dependent upon wood for support, stability or rigidity, and in which interior framing is of wood or other combustible materials.

607.2 — LOCATION OF PROPERTY

All exterior walls of Type VI, Wood Frame buildings located less than three (3) feet from property lines shall provide not less than one hour fire-resistive protection.

607.3 — BUILDINGS LOCATED ON THE SAME LOT

Where two or more buildings of Type VI construction are on the same lot, there shall be a clear space of not less than six (6) feet between the buildings unless one of the exposed walls has at least one hour fire-resistance.

607.4 — FIRE DISTRICTS

Type VI—Wood Frame Construction—is prohibited in the Fire Districts No. 1 and No. 2, except as provided for in Section 301.2.

607.5 — ALLOWABLE HEIGHT — SECTIONS 404 to 411, inclusive

607.6 — ALLOWABLE AREA — SECTIONS 404 to 411, inclusive

607.7 — FIRE PROTECTIVE REQUIREMENTS — TYPE VI — WOOD FRAME

TABLE 607.7 — FIRE PROTECTIVE REQUIREMENTS — TYPE VI — WOOD FRAME

STRUCTURAL MEMBERS	Required Fire Resistance (Hours)	
WALLS		
Party Walls	4	Party and fire walls shall extend not less than three (3) feet above the roof, except that fire walls need not extend above the roof where the roof is of noncombustible construction for the area within forty (40) feet of each side of the wall.
Fire Walls	4	

TABLE 607.7 — (Continued)

PARTITIONS		
Interior		Enclosure for vertical openings — Sect. 701. Buildings with mixed occupancies — Sect. 412. All other partitions—Sec. 702.
COLUMNS		
TRUSSES		
GIRDERS		
BEAMS		
Supporting Masonry or Bearing Walls, Columns, Girders, Trusses	1	This requirement applies only to structural members supporting masonry walls except that this does not apply in one (1) story buildings or where the only masonry supported is a masonry veneer.

FIRESTOPPING .....Section 705
PRIVATE GARAGES .....Section 506
ROOF COVERING .....Sections 301 and 706

SECTION 607.8 — BUILDING REQUIREMENTS:

a. Wood (Design and Construction of Frame Buildings) .....Chapter XVII
b. Minimum Design Loads .....Chapter XII
c. Foundations .....Chapter XIII
d. Concrete (Mixing and Materials) ....Chapter XVI
e. Masonry and Veneered Walls (Partitions and Walls) .....Chapter XIV
f. Lathing and Plastering (Stucco) ....Chapter XVIII
g. Safeguarding during erection .....Chapter XXI

SECTION 608 — EXCEPTIONS TO FIRE PROTECTION

608.1 — ELEVATOR FRAMES

Structural members of frames for elevators will not be required to have the fire protection required for structural steel, provided such members are erected within an enclosure of the prescribed fire-resistance rating. Section 701—Enclosure of Vertical Openings.

608.2 — LINTELS

Lintels over openings in walls shall be protected to provide a fire-resistance rating at least equal to that required for beams, except that when such lintels are used over openings less than four (4) feet wide, such protection may be omitted. The outer member of an assembled steel lintel, which supports face masonry that is securely bonded to backing need not be protected, provided that the load carrying member of such lintel is protected as herein required.

SECTION 609 — MIXED TYPES OF CONSTRUCTION

609.1

When two or more types of construction occur in the same building and are not separated by the fire separation specified in Section 412 for Mixed Occupancies, the entire building shall be subject to the occupancy restrictions of the last fire resistive type.

609.2

Where a building is constructed of more than one type of construction, the following limitations shall be observed:

TYPE I construction shall not be supported by any other type.

TYPE II construction shall not be supported by construction other than Type I or Type II.

TYPE III construction shall not be supported by construction other than Type I, Type II or Type III.

TYPE IV construction shall not be supported by Type V, or Type VI.

TYPE V construction shall not be supported by Type VI.

610 — NON-COMBUSTIBLE EXTERIOR WALLS OR PANELS

Non-combustible walls or panels may be permitted in exterior non-bearing walls under the following conditions:

(1) Provided such walls are of non-combustible material.

(2) Provided such walls face a street or permanent open space of 30 feet or more in width.

(3) Provided that in buildings over two stories in height, exterior openings located in a story above a Group D, Institutional; Group F, Storage; Group G, Industrial; Group H, Hazardous Occupancy are separated from such an occupancy by a 2-hour fire-resistive wall construction not less than 3 feet in height.

SECTION 611 — BUILDINGS LOCATED ON THE SAME LOT

"Where the exterior walls of two or more buildings located on the same lot face one another, and one of the walls is not constructed as required for a fire wall, a common-property line shall be assumed between them. The fire-resistance requirements for such facing walls and for the protection of openings therein shall be the same as required by this code for walls and openings facing common-property lines, except as otherwise prescribed in Section 607.3 for buildings of Type VI - Wood Frame Construction."

CHAPTER VII

FIRE PROTECTION REQUIREMENTS

SECTION 701

PROTECTION OF VERTICAL OPENINGS, STAIRS AND ELEVATORS

701.1 — GENERAL REQUIREMENTS FOR ENCLOSURE, OF VERTICAL OPENINGS OR SHAFTS

Every series of openings in floors or roofs, except one and two family dwellings, shall be enclosed to prevent spread of fire from story to story, as herein specified, unless otherwise specifically provided in this code.

In buildings more than two (2) stories in height, other than one and two family dwellings, all vertical shafts extending through more than one story shall be enclosed in all stories with partitions of not less than 2-hour fire-resistive construction, unless otherwise prescribed in Sections 701.2, 701.3 and 701.4. In Group A, Residential buildings not over three (3) stories in height, such partitions shall provide at least 1-hour fire resistance. A shaft that does not extend through the roof shall have its top enclosed with construction having fire-resistance at least equal to that of the enclosing walls.

In buildings of Group A Residential and Group C Schools of three stories or less in height with verandas where each room opens directly on the veranda, exit stairways may extend from floor to floor on the outside, provided such stairways are protected by 2-hour fire-resistive separation from the building for a distance of ten feet on each side of the exit stairways, and provided that proper protection from the elements be furnished as approved by the Building Official.

For bearing partition requirements see types of construction, Chapter VI.

Parapet walls at least thirty-six (36) inches in height above the roof shall be provided around all open shaft enclosures that extend through a roof except that where roof is of non-combustible construction a hand rail at least thirty (30) inches high may be used around openings instead of a wall.

All shaftway enclosures extending above the roof of a building, except those open at the top, shall have a skylight with metal frame glazed with plain glass and with protective wire mesh screen below, conforming with Section 707; such skylight shall have an area equal to at least seventy five (75) per cent of the area of the shaftway at the top story, or other equivalent ventilation shall be provided. A window of plain glass of equivalent area, located in the side of the

shaft may be used instead of a skylight provided it has its sill not less than two (2) feet above the roof and does not face a property line within ten (10) feet.

In every building where the enclosing walls or shafts are open to the outer air at the top, they shall be constructed to provide fire resistance equivalent to that specified in Chapter VI, for the inner court walls of such a building.

Openings in all shaft enclosures shall be limited to those absolutely necessary for the purposes of the shaft and shall be protected with approved fire doors, fire shutters, or fire windows (see Section 703.6).

701.2 — STAIRWAY AND EXIT ENCLOSURES

In all buildings, four (4) stories or more in height, except one and two family dwellings, and except in those occupied by forty (40) people or less above or below the story at street level, all interior stairways including platforms, landings and hallways connecting them to the doorway leading to the outside, shall be completely enclosed with partitions of not less than 2-hour fire-resistive construction. Structural members supporting all such enclosing walls and partitions, and floors or roofs that form a part of the enclosure shall have at least 2-hour fire resistance also.

In all buildings, two (2) or three (3) stories in height excepting one or two family dwellings, all required interior stairways shall be enclosed in partitions of at least 1-hour fire resistance.

For stair enclosure requirements governing Group E assembly occupancies, see Section 512.3.

No enclosure shall be required for a flight of "monumental" stairs (as used in public buildings, stores, hotels, office buildings, etc.) from the main street entrance floor to the floor next above (or to the basement) when such stairs are not a part of the required exit facilities, or for such stairs leading to a mezzanine or balcony from the main floor.

Stairways in buildings of Group G, Industrial occupancies, that are not required for exits and that serve only one floor above the first floor may not be required to be enclosed, provided the occupancy of the building is of low fire hazard and provided the omission of such stair enclosure is approved by the Building Official.

Basement or cellar stairs: Except in one and two family dwellings, basement or cellar stairways located under stairways from upper stories shall be completely enclosed by construction providing fire resistance not less than required for the stair enclosure above the basement but in no case less than 1-hour fire resistance.

No openings shall be permitted in a stairway enclosure except as permitted in Section 703.6.

For general requirements see Section 701.1.

701.3 — ELEVATOR ENCLOSURES

Not more than three (3) elevators shall be placed in one shaft and such shaft enclosure shall have at least 2-hour fire resistance, except that in residential buildings of Group A, or any Group B building, not over three (3) stories in height, enclosures may be of construction having 1-hour fire resistance.

In shaftways for elevators there shall be at least one (1) door in every thirty (30) feet of height. All openings shall be protected as required in Section 703.6.

Elevators counted as exits shall not be in a common enclosing shaft with a stairway, and the path of travel from one flight of stairs to the next shall not pass directly in front of elevator doors.

An elevator shaft that does not extend to the bottom of a building shall be enclosed at its lower point to provide fire-resistance not less than that required for the lowest floor through which the elevator passes, but in no case less than is required for Type II construction.

The compartment that contains machinery for operating an elevator shall be separated from the elevator shaft by Type I, Fireproof, or Type II, Fire Resistive construction, and shall be enclosed with partitions having at least 2-hour fire resistance and all openings shall be equipped with approved fire doors.

For general requirements see Section 701.1.

701.4 — ESCALATOR ENCLOSURES

The same requirements shall apply to escalator enclosures as apply to stairway enclosures; (see Section 701.2), except that in Type I, Fireproof, or Type II, Fire Resistive construction, the escalator opening need only be enclosed by fire resistive partitions at the upper floor level served, provided such escalator is not used as a required means of exit.

SECTION 702 — PARTITIONS

702.1 — GENERAL

This section shall apply to partition requirements for the various occupancies and types of construction. Fire resistive ratings shall conform to provisions of Chapter X. Height and thickness of Masonry Partitions shall not be less than specified in Section 1406.

Non-bearing masonry partitions shall be built solidly against the floor and ceiling construction below and above.

Solid or hollow non-bearing partitions of plaster continuously reinforced with metal or gypsum lath applied over vertical steel or iron studs or solid, studless gypsum or metal lath and plaster partitions shall be anchored or firmly attached to metal track which is suitably anchored to floor and ceiling construction. Such solid reinforced plaster partitions shall have a minimum thickness of not less

than two (2) inches and their minimum out-to-out thickness shall be governed by their unsupported heights.

For hollow partitions of metal lath and plaster construction, the thickness of plaster of each side shall be not less than three-quarters (¾) inch, with not less than one (1) inch separation.

For the fire resistance ratings of partitions, see Section 1002.

702.2 — PARTITION REQUIREMENTS

All non-bearing partitions shall conform to these fire-resistive requirements, except as otherwise specified. See interior finish requirements of Section 704.

TYPE I—FIREPROOF—Partitions, except as modified in this section, shall be of non-combustible material and of not less than one-hour fire-resistive construction.

TYPE II—FIRE-RESISTIVE—Partitions, except as modified in this section, shall be of non-combustible material.

TYPE III—HEAVY TIMBER—Partitions shall be of one-hour fire-resistive construction or may be of wood construction formed of two (2) layers of one (1) inch nominal matched boards, or of solid wood laminated construction not less than three and five-eighths (3⅝) inches thick.

TYPE IV—NON-COMBUSTIBLE AND
TYPE V—ORDINARY—In buildings over two (2) stories in height, unless sprinklered, if located within the First Fire District, all permanent partitions shall be of not less than one-hour fire-resistive construction.

GROUP A—RESIDENTIAL—All partitions, except one and two family dwellings, along public hallways or partitions that separate apartments, or that separate apartments from other occupancies, shall be of not less than one-hour fire-resistive construction.

GROUP B—BUSINESS BUILDINGS—In buildings more than one story in height, partitions along public hallways shall be of one-hour fire-resistive construction.
Regardless of type of construction, temporary non-fire-resistive partitions may be constructed up to three-fourths the height of a room in which placed. If such partition is more than three-fourths the height of the room, the upper one-fourth of the partition shall be constructed of plain glass set in sash. All such non-fire-resistive partitions shall be used only within rooms or spaces not exceeding five thousand (5,000) square feet; provided such room or space be enclosed within partitions of not less than one-hour fire-resistive construction. When the first floor is arranged so it is to be occupied by more than one tenant, the area occupied by each

tenant shall be separated from adjacent tenants by a partition of not less than one-hour fire-resistive construction (see Section 412 for mixed occupancy separations).

GROUP C—SCHOOLS—Partitions in buildings two or more stories in height shall be of not less than one-hour fire-resistive construction. All partitions in one-story buildings, except in rooms having direct exit to outside, shall be protected with non-combustible material.

GROUP D—INSTITUTIONAL—All partitions shall be of not less than one-hour fire-resistive construction.

GROUP E—THEATERS AND PUBLIC ASSEMBLY—See Section 512.3 for partition requirements.

GROUP F—STORAGE

GROUP G—INDUSTRIAL AND
GROUP H—SPECIAL OCCUPANCIES—Partitions in Group F and Group G buildings over three (3) stories, and all partitions in Group H buildings shall be of not less than one-hour fire-resistive construction, except where greater fire-resistance is required. Combustible partitions may be used within accessory offices and rooms necessary for transacting the principal business of such occupancies, provided that such rooms are used for non-hazardous purposes.

SECTION 703 — PROTECTION OF WALL OPENINGS

703.1 (a) — WHERE PROTECTION IS REQUIRED

For the purpose of this section, when a building is divided by fire walls into two or more sections, each section shall be regarded as a separate building.

Every building (except one and two family dwellings which are less than three (3) stories in height, churches, buildings of Type VI, Wood Frame construction, and public parking decks as defined in Section 507.2), shall have approved fire windows, fire doors or other approved protectives, in every opening in the exterior walls under the following conditions:

1. In buildings three (3) stories or more in height where the distance is fifteen (15) feet or less from the property line. For building less than three (3) stories in height, protection shall be required only where the distance is eight (8) feet or less from the property line.

2. In buildings where such opening is above and less than fifteen (15) feet distance from any part of a neighboring roof.

Exceptions: Such protection shall not be required for show windows facing on a street or public place which do not extend above the second full story above grade nor shall such

protection be required when the opening to be protected and the opening against which it is to be protected are facing in the same direction being located in walls in the same or parallel lines. All required opening protection shall be of approved type as defined elsewhere in this section.

703.1 (b) — EXTERIOR WALLS WITHOUT WINDOW OPENINGS

In buildings having exterior walls of length over two hundred (200) feet without openings, access panels at each floor level up to and including buildings seventy (70) feet in height shall be provided and shall be spaced so as to reasonably provide access to the building by firemen in the event of fire. Said panels shall be effectively marked so as to permit easy identification.

Access panels shall also be provided as directed by the Building Official, where openings in exterior walls on street fronts are either lacking or are insufficient to provide ready access by firemen.

Such access openings shall be provided with approved fire protection where required under the conditions specified in this section.

703.2 (a) — APPROVED TYPES OF FIRE WINDOWS, FIRE DOORS, AND FIRE SHUTTERS

Fire windows, fire doors and fire shutters shall be deemed approved if satisfactory evidence is given that they have successfully passed a fire test as specified in this section, conducted by an accredited laboratory, provided a test report is filed with the Building Official from such accredited laboratory. Every fire window, fire door and fire shutter shall bear the label or identification of an approved testing agency showing the classification.

703.2 (b) — FIRE TESTS OF PROTECTIVE DOOR OR SHUTTER ASSEMBLIES

Tests of opening protective assemblies shall be made upon complete full size assemblies, except that in any case the assembly need not exceed one hundred eight (108) Sq. Ft. in area, constructed and installed in all essentials as in actual service and subjected to a fire on one side continuously for periods in accordance with the time-temperature curve of the standard fire test specifications prescribed in Section 601 (ASTM "Standard Methods of Fire Tests of Building Construction and Materials" (E119-58).

Opening protective assemblies tested to establish a fire-resistive rating (one hour or more) shall be subjected to a hose stream test conducted in accordance with the standard ASTM fire test specifications, "Fire Tests of Door Assemblies, E152-58."

The duration of the fire test shall be as follows:

For fire doors required in 4-Hr. fire-resistive walls or partitions 3-Hrs.

For fire doors required in 3-Hr. fire-resistive walls or partitions 1½-Hrs.

For fire doors required in 2-Hr., or less, fire-resistive walls ¾-Hrs.

For fire shutter assemblies ¾-Hrs.

When two fire door assemblies each of which has been accepted for a one and one-half (1½) hour fire-resistive rating, are installed on two (2) sides of the same opening, such combined assembly shall be accepted as having a 3-hour fire-resistive rating. Similarly, two door assemblies, each having a three-quarter (¾) hour rating, shall be accepted as having a one and one-half (1½) hour rating.

703.2(c) — FIRE SHUTTERS

Tests of fire shutters to be successful shall meet the requirements for fire doors except that no restriction shall be made as to the amount of heat transmitted through the shutters.

703.2 (d) — FIRE WINDOWS

Fire windows shall have a fire-resistance rating of not less than three-quarters (¾) of an hour, and shall have frame and sash of solid steel sections or of hollow metal forms fabricated by pressing, riveting, interlocking, welding or crimping together but not by the use of solder or other fusible alloy.

Wire glass not less than one-quarter (¼) inch thick shall be used in all fire-resistive windows. Size of individual glass lights shall not exceed seven hundred and twenty (720) Sq. In. of exposed area. Continuous glazing angles shall be provided on the inside of all fire windows, except such casement section sash, outside glazed, having wire clips, as have been approved by the Underwriters.

Maximum sizes of fire windows shall be as follows:

Hollow metal window frames shall be limited to a height not exceeding ten (10) Ft. and a maximum width of six (6) Ft. for double hung and for counterweighted type and for counterbalanced type; a maximum width of six (6) Ft. for fixed sash windows and of five (5) Ft. for all other types. Hollow metal mullions shall be used for non-bearing purposes only.

Solid section window frames shall be limited to a maximum size of eighty-four (84) Sq. Ft. with maximum dimension not exceeding twelve (12) Ft. except that solid section windows when used with the unprotected steel mullions shall be limited to seven (7) Ft. in width. Solid section mullions when used in length exceeding twelve (12) Ft. shall be fire protected to provide the same degree of fire-

resistance as is required for the wall construction of the building in which they are placed.

703.3 — VERTICAL SEPARATION OF OPENINGS

Exterior openings in a building, that are located vertically above one another and which are not protected by approved types of fire windows or fire doors shall have a space of not less than three (3) Ft. between the top of one opening and the bottom of the next above, or such openings above the lowest shall be protected against fire by an approved protective device. Such wall space shall be constructed of materials having fire-resistance meeting the requirements for the exterior walls of the type of construction used for such building, as prescribed in Chapter VI of this code.

703.4 — PROTECTION OF DOOR OPENINGS IN WALLS AND PARTITIONS

Wherever protection of door openings is required by this code and in all walls and partitions which are required to be of 2-hour or more fire-resistive construction, door openings shall be protected with approved fire doors meeting the requirements of Section 703.2. In addition, wherever deemed necessary by the Building Official, approved fire doors may be required for the protection of exits or of adjoining property.

In 4-hour and 3-hour fire-resistive walls or partitions, no opening shall exceed one hundred twenty (120) Sq. Ft. in area with no dimension greater than twelve (12) Ft., and the aggregate width of all openings at any level shall not exceed twenty-five percent of the length of such wall or partition. Every door opening in such wall or partition shall be protected on each side with an approved automatic fire door; provided that when such wall or partition serves also as a horizontal exit, it shall have no openings other than door openings not exceeding forty-eight (48) Sq. Ft. in area, and one of the automatic fire doors at each opening shall be replaced by a self-closing fire door.

In 2-hour fire-resistive walls or partitions, no single door opening shall exceed one hundred eighty (180) Sq. Ft. in area. The aggregate width of all openings in such walls or partitions at any level shall not exceed that permitted for three-hour walls. Every door opening shall be protected with an approved automatic or self-closing fire door, provided that when such wall serves also as a horizontal exit, no opening shall exceed forty eight (48) Sq. Ft. in area and protection shall be provided by an approved self-closing fire door.

In 1-hour fire-resistive walls or partitions, unless otherwise specified, all door openings shall be protected with approved metal or metal covered doors or wooden doors of the solid core flush type of nominal thickness of at least one and three quarters (1¾) inch in all parts.

See Section 703.2 for fire-resistance requirements of fire doors.

When proof satisfactory to the Building Official is furnished that a larger size of opening than prescribed herein is necessary, the area may be increased if such opening is provided with protective devices that meet the approval of the Building Official.

703.5 — FIRE SHUTTERS

When equipped with fire shutters of the swinging type, at least one in every three openings facing a street in each story shall have such shutters arranged to be readily opened from the outside. Distinguishing marks shall be provided on these shutters.

Fire shutters of the rolling type shall be carefully counterbalanced and so arranged that they can be readily opened from the outside.

703.6 — OPENINGS IN STAIRWAYS OR SHAFTWAYS

Shaft walls or enclosures of vertical openings shall have no openings other than such as are necessary for the purpose of the shaftway; all openings in shafts shall be protected with approved fire doors, approved fire shutters or approved fire windows.

Swinging doors only shall be used in connection with required stair exits and such doors shall swing in the direction of exit travel but shall not reduce the required width of exit.

In stair enclosure walls or partitions protecting the stair from the interior of the building, no openings except the necessary doorways shall be permitted. (This shall not, however, prohibit the use of fire windows of approved type, in stair enclosures provided they open to the exterior of the building and are located at least ten (10) feet from any other wall opening.) Such doorways shall be equipped with approved self-closing fire doors, except that when enclosing partitions are not required to provide over 1-hour fire-resistance, approved self-closing metal or metal-covered doors or solid core wooden doors of the flush type of nominal thickness of at least one and three quarters (1¾) inch in all parts, may be used.

All openings located within 10 feet of exterior stairways or fire escapes shall be protected with approved self-closing fire doors or approved fire windows, except where the door serves such exitway.

703.7 — OPENINGS IN MIXED OCCUPANCY SEPARATIONS

See Section 703.4 for requirements governing door openings in walls and partitions required to be of fire-resistive construction.

SECTION 704

RESTRICTIONS ON INTERIOR USE OF COMBUSTIBLE MATERIALS

704.1 — GENERAL

Combustible materials may be used for ceilings, floor finish or other interior finish of buildings as provided in this Section. Show windows in the first story of buildings may be of wood or of unprotected metal framing.

704.2 — FLOOR FINISH

In buildings of Type I, Fireproof construction or of Type II, Fire-Resistive construction, floor finish, if of combustible material, shall be applied directly upon the floor construction except that a floor finish of wood, linoleum, rubber, tile or cork may be secured to a subfloor of wood. Where wood sleepers are used for laying wood floors in such buildings, the space between the floor slab and the underside of the finished floor shall be filled solidly with non-combustible material so there will be no open spaces under the flooring exceeding one hundred (100) Sq. Ft. and so there will be no open space extending under any permanent partition.

Combustible insulating boards may be used for sound deadening, or insulating of floors, except that in buildings required to be of Type I, Fireproof Construction or of Type II Fire-Resistive Construction, such insulating board shall not be more than one-half (½) inch thick and cemented directly to the floor slab or secured to wood sleepers fire stopped as called for above and covered with approved finish flooring.

704.3 — CEILINGS AND INTERIOR WALL FINISH*

In every building except Type VI, wood frame construction, and one and two family dwellings, combustible materials for ceiling and for interior finish of side walls and partitions shall be of a type which will not have a rate of flame spread in excess of that of wood or fiberboard and will not develop gases more toxic or noxious than wood or fiberboard when exposed to heat or flame. Such materials when applied to an incombustible base shall be installed in an approved manner.

The use of a surface finish of paper or of material of no greater fire hazard than paper shall not be prohibited provided such finish does not exceed 0.025 of an inch in thickness, and is applied directly to an incombustible base.

Materials used for ceilings and interior wall finish in Type I and Type II buildings over three stories in height shall be non-combustible except that this shall not prohibit the use of wood trim for door and

window cases, chair rails, picture mouldings, base boards, wall paneling and the like, provided such woodwork is backed solidly by non-combustible material. Fiberboard wall and ceiling finish may be used if applied to a non-combustible base or to furring strips, not exceeding one inch nominal thickness, applied over a non-combustible base with all spaces in back of the fiberboard in excess of eight square feet in area filled with a non-combustible material.

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*For interior finish and decoration for Group E, Assembly Occupancy, see Section 512.2.

SECTION 705 — FIRESTOPPING

Firestopping shall be provided in all walls and partitions to cut off all concealed draft openings both horizontal and vertical, and to form an effectual fire barrier between stories and between the upper story and the roof space.

Walls, including masonry walls furred with combustible material, and stud partitions shall be effectively firestopped with non-combustible material at floors, ceilings, and roofs, except in those parts of a buildings which are framed with wood, the firestopping may be of wood not less than two (2) inches in nominal thickness. (See Section 1702.6.)

All openings around exposed pipes or power shafting shall be filled with approved non-combustible material, or shall be closed off by close-fitting metal caps at the ceiling and floor line, and on each side of a wall or partition.

All openings for belts and conveyors shall be provided with approved slotted doors, or be otherwise closed off. Belts shall not pass through fire-walls.

No firestopping shall be covered or concealed until inspected by the Building Official.

In combustible roof construction, where ceilings or concealed spaces occur, such spaces shall be divided into horizontal areas of not more than three thousand (3,000) square feet (except one and two family dwellings) with tight partitions of non-combustible material or of approved wood construction consisting of one-half inch exterior plywood or of not less than two thicknesses of one (1) inch nominal lumber with joints broken.

All openings through these partitions shall be protected by self-closing doors of approved construction meeting the partition requirements.

Except in 1 and 2-family dwellings, when stairs are of wood or of combustible construction, the space between stair stringers shall be firestopped at top and bottom and at least once in the middle of each run, and firestopping shall also be provided between studs, along and in line with run of stair adjoining such partition.

Floors and roof constructed of combustible materials shall be firestopped at walls and partitions where openings occur. When wood joists run parallel to a wall, the space between the wall and the nearest joist shall be not less than two and one-half (2½) inches and shall be solidly filled with non-combustible material.

Joists in all types of construction shall be firestopped at the ends and over supports for the full depth of the joists.

Spaces between chimneys and wood framing shall be solidly firestopped with mortar, concrete, or other non-combustible material. except as provided for in Section 802.1 (d) — suspended or Metal Chimneys.
(See Section 1702.6.)

In firestopping, any of the following materials may be used: brick, concrete, gypsum, steel, iron, asbestos, metal lath and cement or gypsum plaster, mineral wool, rock wool, or other approved non-combustible materials, securely fastened in place to cut off drafts and provide an effective fire stop.

SECTION 706 — ROOF COVERINGS

706.1 — GENERAL

Roof coverings shall be divided into the classes defined below, whose use within the Fire District shall be governed by the requirements of Sec. 301.3(d).

706.2 — CLASS I ROOF COVERINGS*

Class I Roof Coverings shall include the following: Brick-Concrete-Slate-Tile-Corrugated Asbestos Cement-built-up 4 and 5-ply Felt, with Pitch, and Gravel or Pitch and Slag, and Built-up Asbestos Felt.

706.3 — CLASS 2 ROOF COVERINGS*

Class 2 Roof Coverings shall include the following: corrugated iron sheets; galvanized iron sheets; galvanized iron shingles; sheet copper; galvanized iron, asphalt asbestos felt shingles; asphalt asbestos roll roofing; and asphalt asbestos cement shingles.

706.4 — CLASS 3 ROOF COVERINGS*

Class 3 Roof Coverings shall include the following: asphalt rag-felt mineral-surfaced individual or strip shingles weighing not less than 180 lb. per 100 sq. ft. of material, laid with 2" or more head lap; and asphalt rag-felt smooth-surfaced roll roofing laid in single thickness with 2" or more end and side laps — Aluminum .019 inches in thickness — Wood Shingles — Red Cedar Shingles edge grain (see Section 706.6).

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*In addition to those listed, any roof covering that is equivalent to listing of Underwriters' Laboratories, Inc. may be accepted.

706.5 — REQUIREMENTS FOR ROOFS OUTSIDE FIRE DISTRICT

Roofs on buildings outside of the Fire Districts, as established in Chapter III, may be of Class 1, Class 2, or Class 3 roof coverings, as specified herein. Wood shingles shall not be used except as provided in this Section.

706.6 WOOD SHINGLES

Outside the fire districts, dwellings and private garages separated by at least 12 feet from other buildings may be roofed with approved vertical grain or edgegrain wooden shingles, or handsplit shakes, securely fastened with rust-resistant nails. Each course of shakes shall be underlaid with an 18-inch wide layer of 30# roofing felt. Unless otherwise specified by ordinance or duly promulgated rules, the Commercial Standard for Wood Shingles, CS31-52 of the U. S. Department of Commerce, shall be accepted as means of establishing grade of shingles.

TABLE — WEATHER EXPOSURE AND ROOF PITCH

	Roof Pitch	3/12	4/12	5/12 and Up
Shingles	16-inch	3¾"	4½"	5"
	18-inch	4¼"	5"	5½"
	24-inch	5¾"	6¾"	7½"
Shakes	18-inch	------	8½"	8½"
	24-inch	------	10"	10"
	32-inch		13"	13"

706.7 — ROOF INSULATION

The use of cork, fiberboard or other approved insulation shall be permitted in all types of construction provided it is covered with approved roof coverings applied directly thereto.

SECTION 707 — SKYLIGHTS

Except in Type VI, Wood Frame Buildings, the sashes and frames of all skylights hereafter placed on a building shall be constructed of steel, wrought iron, or other approved metal; except that in foundries or buildings where acid fumes which attack those metals, are present as an incident to the occupancy of such buildings, such sashes and frames may be constructed of wood if approved specifically by the Building Official.

Skylights shall be glazed with wire glass; except that skylights placed over shaftways, vent shafts, and stair enclosures shall be glazed with plain glass not over one-eighth (1/8) inch in thickness. No single pane of wire glass shall exceed seven hundred twenty (720) Sq. In. in area, or forty-eight (48) inches in any dimension. Skylights of approved plastics may be used where glass of ⅛" thickness is required.

Every skylight in which plain glass is used shall be protected by a substantial wire screen, having a mesh not less than three-quarter

by three-quarter (¾ x ¾) inch nor coarser than one by one (1 x 1) inch and made of wire not smaller than No. 12 B. and S. gauge, located at a distance not less than four (4) inches nor more than ten (10) inches above the glazed portion of such portion of such skylight at all points, and extending beyond such glazed portion on all sides, a distance not less than the height of the screen above the glass. A similar screen shall be placed below such skylight in such position as to serve as a protection from falling glass.

Skylights of approved plastics may be used in accordance with provisions of Chapter XXVI.

The above provisions shall not apply to skylights used in or as the roofs of greenhouses.

SECTION 708 — MANSARD OR SLANTING ROOFS

Every mansard or other slanting roof having a pitch of more than sixty degrees (60 degrees) hereafter placed on any building over fifty (50) feet in height, shall be of non-combustible construction providing not less than 1-hour fire resistance, except that when such building exceeds eighty (80) feet in height, such roofs shall be of construction providing not less than 1½ hour fire resistance.

SECTION 709 — DORMER WINDOWS

Dormer windows hereafter erected shall be of the same type of construction as the roof on which they are placed, or of the side walls of the building. The top and sides shall be covered with roofing materials conforming with the requirements governing the roofing of the building.

SECTION 710 — CORNICES, BALCONIES, BAY WINDOWS

All cornices, including those on show windows, hereafter placed on the exterior of buildings within the Fire Districts or on buildings over forty (40) feet in height located outside the Fire Districts shall be of non-combustible materials. The exterior of cornices on buildings forty (40) feet or less in height located outside of Fire Districts, except 1 and 2-family dwellings, and buildings of Type VI, Wood Frame construction, shall be of non-combustible material, or shall be covered with non-combustible material, when located within five (5) feet of lot line or of another building.

Continuous exterior cornices of wood, or on wood frames, shall be firestopped at intervals not exceeding twenty (20) feet.

Balconies, and bay windows, shall conform to the type of construction required for the building to which they are attached, except that all exterior balconies attached to, or supported by, walls of material other than wood, shall have brackets or beams of steel, concrete, or other non-combustible material.

SECTION 711 — GUTTERS AND LEADERS

Gutters and leaders hereafter placed on buildings other than 1 or 2-family dwellings, private garages, or buildings of Type VI Wood Frame construction, shall be of non-combustible material.
(See section 1407 for Parapet Wall relief opening requirements.)

SECTION 712 — TOWERS, SPIRES, CUPOLAS, AERIAL SUPPORTS, POLES, ETC.

Any tower, spire, dome or cupola shall be of a type of construction not less in fire-resistance rating than required for the building to which it is attached except that any such tower, spire, dome or cupola which exceeds sixty (60) feet in height above grade, and all construction upon which it is supported, shall be of Type I, Fireproof; or Type II, Fire Resistive construction when the area at any horizontal section of such tower, spire, dome, or cupola exceeds two hundred (200) Sq. Ft. or when it is used for any purpose other than a belfry or an architectural embellishment.

Any tower, spire, dome or cupola which exceeds twenty-five (25) feet in height above the highest point at which it comes in contact with the roof or which exceeds two hundred (200) Sq. Ft. in area at any horizontal section or which is intended to be used for any purpose other than a belfry or architectural embellishment, shall be entirely constructed of and supported by non-combustible materials. Such structures shall be separated from the building below by construction having a fire-resistance rating of not less than 1½ hours and, if access doors are provided, they shall be of approved fire-resistive type.

All structures, except aerial supports not over twelve (12) feet high, flag poles, water tanks and cooling towers, hereafter placed above the roof of any building within the Fire Districts, or above the roof of any building more than fifty (50) feet in height, wherever located, shall be of non-combustible material, and shall be supported by construction of non-combustible material.

SECTION 713 — TANKS

Tanks of more than five hundred (500) gallons capacity hereafter placed in or on a building shall be supported on masonry, reinforced concrete or steel construction, except that portion of the supporting structure which is above the roof of the building may be of heavy timbers; provided that when such construction is within the building it shall be as required for Type I — Fire Proof Construction.

Such tanks shall have in the bottom or on the side near the bottom, a pipe or outlet, fitted with a suitable quick opening valve for discharging the contents in an emergency through an adequate drain.

Such tanks shall not be placed over nor near a line of stairs or an elevator shaft, unless there is a solid roof or floor underneath the tank.

All unenclosed roof tanks shall have covers sloping toward the outer edges.

When hoops are used in the construction of tanks, they shall be of metal, and provision shall be made to guard against corrosion.

SECTION 714 — COOLING TOWERS

Cooling towers in excess of 250 Sq. Ft. in base area or in excess of 15 Ft. in height, when located on buildings more than 50 Ft. in height in or out of the Fire Districts, shall be of non-combustible construction; except that drip boards may be of wood not less than one (1) inch nominal thickness and the enclosing frame work may be of wood, if covered on the exterior of the tower with non-combustible material. Cooling towers shall not exceed one-third of the supporting roof area.

SECTION 715 — DRYING ROOMS

Drying rooms or dry kilns located within a building shall be constructed entirely of non-combustible materials where used or intended to be used at temperatures exceeding one hundred twenty five degrees (125 degrees) fahrenheit; if enclosure is of metal, it shall be insulated from all combustible material by not less than a twelve (12) inch air space, one-quarter (¼) inch asbestos or other approved insulation.

All drying rooms shall have approved ventilation.

Heating pipes, not located overhead, shall be shielded to maintain not less than two (2) inch clearance between them and the contents.

CHAPTER VIII — HEATING

SECTION 801 — GENERAL

This Chapter shall apply to heating installations, except as otherwise provided for in the Southern Standard Building Code, Part II Gas.

801.1 — DEFINITIONS

AUXILIARY EQUIPMENT—Auxiliary equipment shall mean that equipment used in connection with combustion equipment such as stokers, burners, draft regulations, etc.

CENTRAL HEATING BOILERS AND FURNACES—Heating furnaces and boilers shall include warm air furnaces, floor mounted direct-fired unit heaters, hot water boilers, and steam boilers operating at not in excess of 15 pounds gauge pressure, used for heating of buildings or structures.

Mechanical warm air furnaces are here defined as warm air furnaces which are equipped with a fan to circulate the air.

Devices referred to as "such that flame from gases do not come in contact with the base" include conventional type heating furnaces and boilers having an ash pit or similar space beneath the burning fuel (whether solid, liquid or gas) and like devices in which the base is not directly exposed to flame or products of combustion.

CHIMNEY—A vertical shaft of masonry, reinforced concrete, or other approved non-combustible, heat resisting material enclosing one or more flues, for the purpose of removing products of combustion from solid, liquid, or gas fuel.

DRAFT HOOD—Is a device placed in, and made part of the flue pipe from an appliance, or in the appliance itself, which is designed to (1) insure the ready escape of the products of combustion in the event of no draft, back draft or stoppage beyond the draft hood; (2) prevent a backdraft from entering the appliance; and (3) neutralize the effect of stack action of the chimney flue upon the operation of the appliance.

FLOOR FURNACE—A completely self-contained unit furnace suspended from the floor of the space being heated, taking air for combustion from oustide this space, and with means for observing flames and lighting the appliance from such space.

(a) Gravity Type Floor Furnace. A floor furnace depending primarily upon circulation of air by gravity. This classification shall also include floor furnaces equipped with booster type fans which do not materially restrict free circulation of air by gravity flow when such fans are not in operation.

(b) Fan Type Floor Furnace. A floor furnace equipped with a fan which provides the primary means for circulating air.

FLUE—A vertical passageway for products of combustion.

HOOD—As applied to a heating device, is a canopy or similar device placed over a stove, range or other heating installation connected to a ventilating duct.

INCINERATORS—An incinerator is a device, using heat, for the reduction of garbage, refuse, or other waste materials.

INDUSTRIAL FURNACES AND POWER BOILERS, STATIONARY-TYPE—For the purposes of these standards stationary-type industrial furnaces and power boilers shall be classified as low, medium or high heat appliances in accordance with their character and size and the temperatures developed in the portions thereof where substances or materials are heated for baking, drying, roasting, melting, vaporizing or other purpose. The Building Official shall by duly promulgated rule designate the classification of any appliance which is not clearly defined in the following paragraphs.

(a) Low heat appliances shall include bakery ovens, candy furnaces, coffee roasting ovens, core ovens, cruller furnaces, lead melting furnaces, rendering furnaces, steam boilers operating at not over 50 pounds per square inch gauge pressure, steam boilers of not over 10 boiler horse power regardless of operating pressure, stereotype furnaces, and wood drying furnaces. Appliances otherwise classed as medium heat appliances may be considered as low heat appliances if furnace volume is not larger than 100 cubic feet in size.

(b) Medium heat appliances (See Low Heat Appliances) shall include annealing furnaces (glass or metal), charcoal furnaces, galvanizing furnaces, gas producers, steam boilers of over 10 boiler horsepower operating at over 50 pounds per square inch gauge pressure. Appliances otherwise classed as high heat appliances may be considered as medium heat appliances if furnace volume is not larger than 100 cubic feet in size.

(c) High heat appliances (See Medium Heat Appliances) shall include billet and bloom furnaces, blast furnaces, brass furnaces, brick kilns, coal gas retorts, cupolas, earthenware kilns, glass furnaces, open hearth furnaces, porcelain baking and glazing kilns, and water gas retorts.

PLENUM CHAMBER—A compartment or chamber to which one or more ducts are connected and which form a part of either the supply or return air system.

UNDERFLOOR HORIZONTAL FURNACES—Means horizontal flow forced warm air devices located under the floor of the heated structure and connected to a duct system.

UNIT HEATERS, CEILING-TYPE DIRECT-FIRED—Ceiling-type direct-fired unit heaters shall include direct-fired unit heaters which are suspended from the ceiling, mounted between uprights or on wall or column brackets. Unit heaters are here defined as appliances consisting of a combination of heating element and fan,

having a common enclosure and placed within or adjacent to the space to be heated.

ROOM OR SPACE HEATER—Space heaters are above the floor devices for direct heating of the space in and adjacent to that which the device is located without heating pipes or ducts.

SMOKE PIPE—A pipe or breeching connecting a heating appliance and a flue.

SMOKESTACK—A vertical flue constructed of metal (lined or unlined), not insulated, to which is connected one or more smoke pipes.

VENT PIPE—As applied to heating, means a pipe for removing products of combustion from gas appliances.

WATER HEATER—A device for the heating and storage of water to be used for other than heating or industrial purposes.

801.2 — FURNACE AND BOILER ROOMS

Every Central Heating Boiler and/or Furnace with an input capacity of 250,000 B.T.U. (British Thermal Units) or over, installed in any building, other than a one or two-family dwelling, shall be enclosed and separated from the rest of the building by walls, partitions, floor and ceiling of not less than one-hour fire resistive construction. Not more than two Central Heating Boilers and/or Furnaces shall be permitted in any one tenancy in any building unless all are enclosed and separated by walls, partitions, floors and ceilings of one-hour fire resistive construction.

Be it further provided that a Central Heating Boiler and/or Furnace of any input capacity installed in a building having a capacity for its particuar use of more than seventy-five persons, or Group 'D' Institutional Occupancy, or Group 'E' Theater or Assembly Occupancy, or Group 'H' Special Hazardous Occupancy, shall be separated from the rest of such building by walls or partitions, floor and ceiling construction having a fire resistive rating of not less than two hours, except as required below.

Every steam boiler carrying more than fifteen (15) pounds per square inch pressure with a rating in excess of ten (10) boiler horsepower, installed in a building other than one of Group G, Industrial Occupancy, shall be located in a separated room, or compartment, and separated from the rest of the building by walls or partitions having at least two-hour fire-resistance and by floor or ceiling construction having not less than two and one-half hour fire-resistance, provided, however, that when in the opinion of the Building Official it is desirable to provide for the venting of a possible explosion upward this rating may be reduced in accordance with the hazard existing.

SECTION 802 — CHIMNEYS

802.1 (a) — GENERAL

Chimneys and flues shall be required for all heating or heat producing appliances except electrical heating and low flue gas temperature (where flue gas does not exceed 550 degrees F. at draft hood) appliances.

No flue shall have smoke pipe connections in more than one story of a building.

Nothing in this Code shall prohibit the joining of two or more smoke pipes for a single flue connection, provided that smoke pipes and flues are of sufficient size to serve all of the appliances thus connected, and provided that, the several smoke pipes are constructed to comply with the severest requirements for any one of those connected.

The smoke pipe of a heating appliance shall not be connected into the flue of an incinerator which has the rubbish chute identical with the smoke flue.

802.1 (b) CHIMNEY CONSTRUCTION

No chimney shall carry any load other than its own dead weight.

All chimney foundations shall be of solid masonry, concrete, or of reinforced concrete, extending to at least six (6) inches below the earth's frost line. Such foundations shall distribute the weight of the chimney uniformly so as not to exceed one-half the bearing capacity of the soil. Such foundation shall be so proportioned and constructed to carry the entire weight of the chimney without settling or cracking.

No chimney shall be corbeled from a wall more than six (6) inches; nor shall such chimney be corbeled from a wall which is less than twelve (12) inches in thickness unless it projects equally on each side of the wall. In every case the corbeling shall not exceed one (1) inch projection for each course of brick projected.

No change in the size or shape of a chimney, where the chimney passes through the roof, shall be made within a distance of six (6) inches above or below the roof joists or rafters.

All chimneys shall be properly capped with brick, terra cotta, stone, cast iron, concrete or other approved non-combustible, weather-proof material.

All chimneys which are or become unsafe or dangerous shall be made safe or taken down.

HEIGHT REQUIREMENTS

Chimneys shall extend at least three (3) feet above the highest point where they pass through the roof of the building and at least two (2) feet higher than any ridge within ten (10) feet of such chimney.

The height of the chimney shall be in accordance with the manufacturer's recommendations, and of sufficient height as to create in the fire box, at all times, adequate draft for proper combustion.

802.1 (c) — MATERIALS AND THICKNESS

Every chimney shall have a flue liner, or liners, as provided in sub-section 802.2 (a). The flue liner, or liners, are required in addition to the chimney wall thickness as herein specified. For high temperature flue requirements see Section 804.1.

BRICK

The walls of brick masonry chimneys shall be not less than three and three-quarter (3¾) inches thick. All brick shall be laid with Class A or B mortar, full mortar joints struck smooth where exposed to the weather.

HOLLOW TILE

Chimneys constructed of hollow tile shall not be used as free standing chimneys, but may be used where the chimney is built in connection with exterior or party walls of hollow units for buildings not exceeding two stories in height. The outer eight (8) inches of such a wall may serve as the outside wall of such a chimney.

CONCRETE

Chimney walls constructed of concrete cast in place, adequately reinforced both horizontally and vertically, shall be not less than three and three-quarter (3¾) inches thick and shall have a flue lining as specified in Section 802.2. Where such reinforced concrete walls are at least six (6) inches in thickness in dwellings, flue lining may be omitted.

FIELD STONE

Chimney walls constructed of field stone shall be considered as coming within the limitations of brick masonry as specified above.

802.1 (d) — SUSPENDED OR METAL CHIMNEYS

Nothing contained in this code shall be construed as prohibiting the use of insulated suspended flue assemblies or patent chimneys provided such assemblies have been tested and approved by a recognized laboratory, for the use intended and are installed in accordance with their approval.

Insulated suspended flues and patent chimneys may be installed with zero clearance on wood structural members, such as framing, roof rafters, floor and ceiling joists and other component structural members, when it has been determined by test reports of recognized and approved testing laboratories that the unit does not transmit heat to the supporting combustible members of more than 90 degrees F. above room temperature.

Patent supports for chimneys attached to ceiling or floor joists shall be permitted provided the joists are of adequate size to support additional load.

All chimney installations shall conform with the height requirements as contained in Section 802.1 (b) of this code.

802.1 (e) — RAISING ADJOINING CHIMNEYS

Whenever a building is hereafter erected, enlarged or raised, the owner of such building shall, at his own expense, carry up, either independently or on his own building, all chimneys, smokestacks, and smoke flues of an adjoining building which are within ten (10) feet of any portion of the wall extending above such chimney or flue.

The construction of such chimney and flues shall conform to all requirements of this Code. Such chimneys and flues shall be carried up simultaneously with the walls.

It shall be the duty of the owner of the building to be erected, enlarged or raised to notify, in writing, at least ten (10) days before such work is to begin, the owner of the chimneys and flues affected, of his intention to carry up such chimneys and flues.

802.2 — FLUE LINING

(a) — WHERE REQUIRED

Every chimney shall have flue linings made of fire clay or other suitable refractory clays designed and proportioned so as to withstand a temperature of 2,000 degrees F. without softening, cracking, or undergoing physical or chemical change.

In no case shall clay linings be less than five-eighths (⅝) inch thick. The use of defective, cracked or broken flue lining shall not be permitted.

Flue linings may be omitted in reinforced concrete chimneys for dwellings where the thickness of such reinforced concrete is at least six (6) inches. (See Section 802.1 (c), Materials and Thickness, Concrete.)

(b) — CONSTRUCTION

Flue linings shall be built ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in Portland cement mortar with close fitting joints left smooth on the inside. All joints and spaces between the masonry and material shall be thoroughly slushed and grouted full as each course of masonry is laid.

Flue linings shall start at least eight (8) inches below the intake, or in the case of fireplaces, at the throat of the fireplace, and be carried as vertically as practicable to a point of not less than four (4) inches above the chimney walls.

(c) — SIZE AND NUMBER OF FLUES

Ordinary and low pressure heating devices burning solid or liquid fuel, shall have an effective flue area as recommended by the equipment manufacturer, but not less than the following:

Small Special Stoves and Heaters	28 Sq. In.
Stoves, Ranges and Room Heaters	40 Sq. In.
Fireplaces (not less than 1/12 the openings)	96 Sq. In.
Warm Air Furnaces, steam and hot water boiler	64 Sq. In.

Such minimum effective flue areas shall be provided by a flue liner with short dimension not less than one-half (½) the long dimension.

Where more than two flues are contained in the same chimney each unit of two flues shall be separated from other flues by masonry not less than three and three-quarter (3¾) inches thick bonded into the wall of the chimney. Adjacent flues, not so separated, shall have joints staggered not less than seven (7) inches.

When it is more economical or desirable to construct chimneys without flue lining, such chimney walls shall be not less than eight (8) inches thick and shall be lined with fire brick bonded in fire clay mortar starting not less than two (2) feet below the intake and extending for at least twenty-five (25) feet above the intake.

802.3 — FIREPLACES

The back and sides of fireplaces shall be of solid masonry or reinforced concrete, not less than eight (8) inches in thickness. A lining of fire brick, at least two (2) inches thick, or other approved materials shall be provided unless the thickness of solid masonry or reinforced concrete is twelve (12) inches. Where a four (4) inch thickness of fire brick is used it may be included in the required minimum thickness of the fireplace.

Fireplaces shall have hearth of brick, stone, tile or other approved non-combustible materials supported on a fireproof slab or on brick trimmer arches. Such hearths shall extend at least sixteen (16) inches in front and not less than eight (8) inches beyond each side of the fireplace opening. The combined thickness of hearth and supporting construction shall be not less than six (6) inches at any point.

FIRESTOPPING

Spaces between chimneys and wood framing or combustible materials shall be firestopped by filling with non-combustible materials. (See Section 705 Firestopping Materials.)

FALSE FIREPLACES

False fireplaces may be used in connection with listed gas or electric heaters, provided such fireplaces are constructed of non-combustible materials.

802.4 — VENTING OF GAS APPLIANCES

Gas appliances shall be vented in accordance with the Southern Standard Building Code, Part II (Gas).

802.5 — SMOKEPIPES

All smokepipes shall be connected to a chimney and flue conforming to the provisions of Section 802.1 Chimneys.

Smokepipes shall be as short and straight as possible and not over twelve feet in length, except as otherwise specifically permitted by the Building Official. Smokepipes shall be constructed of not less than 24 U. S. gauge steel sheet, or integrally waterproofed asbestos cement pipe, not less than 0.25 inches in thickness. Joints shall lap not less than one and one-half (1½) inches and where metal pipe is used it shall be secured by riveting or welding or with not less than three (3) sheet metal screws in each joint. Smokepipes shall be adequately supported.

Where the smokepipe enters the flue, a fire clay tile thimble or other approved type of thimble shall be cemented into the chimney. Such connections shall be airtight.

No smokepipe shall pass through any floor or ceiling. Where a smokepipe passes through a partition it shall be provided with a double metal ventilated thimble not less than twelve (12) inches larger in diameter than the pipe.

Unless otherwise specifically approved, no smokepipe shall come within eighteen (18) inches of any unprotected combustible material, whether plastered or unplastered.

SECTION 803 — CHIMNEYS — HIGH PRESSURE STEAM BOILERS MEDIUM HEAT INDUSTRIAL APPLIANCES

Chimneys of high pressure (over fifteen (15) pounds pressure) steam boilers and of medium heat industrial appliances shall be encased in approved masonry or concrete not less than eight (8) inches thick; provided that stone masonry shall be not less than twelve (12) inches thick; (for metal smokestacks see Section 805) and in addition, shall be lined with not less than four and one-half (4½) inches of fire brick bonded in fire clay mortar, starting not less than two (2) feet below the intake and extending at least twenty-five (25) feet above the intake.

SECTION 804 — CHIMNEYS — HIGH HEAT INDUSTRIAL APPLIANCES

804.1 — CONSTRUCTION

Smoke flues of cupolas, brass furnaces, porcelain baking kilns and other high temperature appliances shall be built with double walls, each of not less than eight inches (8") thickness, with an air space of not less than two (2) inches between them. (For metal smokestacks see Section 805.) The inside of the interior wall shall be of fire brick not less than four and one-half (4½) inches in thickness bonded in fire clay mortar.

804.2 — CUPOLA CHIMNEYS

Chimneys of cupolas, furnaces, blast furnaces and similar devices shall extend at least twenty (20) feet above the highest point of any roof within a fifty (50) foot radius and shall be covered on the top with a heavy wire netting or other approved spark arrester.

804.3 — INCINERATORS

(a) — COMBUSTION CHAMBERS

Except as otherwise provided for in Southern Standard Building Code Part II — Gas, the following requirements shall apply for the construction, installation and venting of incinerators.

Every incinerator shall have all walls of the fire box, or combustion chamber, of solid masonry or reinforced concrete not less than eight (8) inches thick if the grate area does not exceed sixteen (16) square feet. If the grate area exceeds sixteen (16) square feet, the wall shall be not less than twelve (12) inches thick. In either case the inner four (4) inches shall be of fire brick bonded in fire clay mortar. In the ash chamber below the fire grate, the fire brick may be omitted.

SECTION 805 — METAL SMOKESTACKS

805.1 — CONSTRUCTION

(a) Metal smokestacks shall be of adequate thickness, properly riveted or welded and, unless structurally self-supporting, shall be guyed securely, or firmly anchored to or otherwise supported by the building or structure served thereby.

(b) All metal work shall be painted or galvanized or given other approved protection.

(c) Clean-out openings shall be provided at the base of every such stack.

(d) All such stacks hereafter erected shall be supported on substantial foundations, so designed that the maximum average

pressure for both dead and wind loads on the soil shall not exceed ⅔ of the maximum allowable pressure on the soil.

(e) All metal smokestacks used for high heat industrial appliances shall be lined with four and one-half (4½) inch fire brick laid flat in fire clay mortar extending not less than 25 feet above the smoke pipe entrance.

805.2 — HEIGHT

Metal smokestacks shall extend to a height of not less than ten (10) feet above the highest point of any roof within 25 feet.

805.3 — EXTERIOR STACKS

(a) Metal smokestacks, or parts thereof, hereafter erected on the exterior of a building shall have a clearance from the wall of not less than twenty-four (24) inches if the wall is of wood frame construction, and not less than four (4) inches if it is of any other type of construction.

(b) No such stack shall be nearer than twenty-four (24) inches in any direction from a wall opening, exit or fire escape.

(c) When such stack is insulated on the exterior in some approved manner, the clearances herein prescribed may be reduced to two-thirds (2/3) of those specified.

805.4 — INTERIOR STACKS

(a) Metal smokestacks, or parts thereof, hereafter erected within a building other than a one-story building, shall be enclosed above the story in which the appliance served thereby is located, in walls of non-combustible construction having a fire-resistance rating of not less than two hours, with a space on all sides between the stack and the enclosing walls sufficient to render the entire stack accessible for examination and repair.

(b) The enclosing walls shall be without openings, except doorways equipped with approved self-closing fire doors at various floor levels for inspection purposes.

(c) Where such a stack passes through a roof constructed of combustible materials, it shall be guarded by a gavanized iron ventilating thimble extending not less than nine (9) inches below and nine (9) inches above such roof construction. Such thimbles shall be of a size to provide a clearance on all sides of the stack of not less than 18 inches; provided that for stacks of low heat appliances the clearance may be reduced to not less than 6 inches.

(d) Smokestacks shall not be carried up inside of ventilating ducts unless such ducts are constructed as required by this article for smokestacks or smoke flues and such stacks or flues are used

solely for venting the room or space in which the appliance served by the smokestack is located.

SECTION 806 — STEAM AND HOT WATER PIPES

806.1 — STEAM AND HOT WATER PIPES

(a) Steam pipes and hot water heating pipes shall be installed with a clearance of at least one (1) inch to all combustible construction or material, except that at the points where pipes carrying steam or hot water at not over fifteen (15) pounds gauge pressure emerge from a floor, wall or ceiling the clearance at the opening through the finish floor boards or wall or ceiling boards may be less than one (1) inch but not less than one-fourth (¼) inch. Each such opening shall be covered with a plate of non-combustible material.

(b) Such pipes passing through stock shelving shall be covered with not less than one (1) inch of approved insulation.

(c) Wooden boxes or casings enclosing steam or hot water pipes, or wooden covers to recesses in walls in which such pipes are placed, shall be lined with metal or asbestos millboard.

806.2 — PIPE COVERINGS

Covering or insulation used on steam or hot water pipes shall be of non-combustible material.

806.3 — SEALING OPENINGS AROUND PIPES

Where heating pipes pass through floors or partitions of fire-rated construction, the openings around them shall be filled with non-combustible material to prevent the passage of fire.

SECTION 807 — FIRE PROTECTION OF MISCELLANEOUS HEATING DEVICES

807.1 — HOODS

(a) Hoods shall be installed and maintained in accordance with the "Standards of the National Fire Protection Association for the Installation of Blower and Exhaust Systems for Dust Stock and Vapor Removal" (NFPA No. 91, 1949). Restaurant type ranges, candy kettles, cruller furnaces and appliances for the frying of bakery or confectionery products, shall be provided with ventilating hoods and ducts to take off the smoke, gases and vapors; unless such appliances are enclosed and vented in an approved manner.

(b) Non-combustible constructed Grease Filters shall be installed and maintained in all Restaurant or commercial type cooking equipment for exhaust Hoods.

807.2 — BURNING SOLID OR LIQUID FUELS

Every cooking stove, range, water heater or any other heating appliance burning solid or liquid fuel without an open space beneath its base, shall be securely and firmly set on not less than two-hour fire-resistive construction as set forth in Chapter X. Such construction shall extend not less than twelve (12) inches beyond the appliance on all sides and not less than eighteen (18) inches on side from which ashes are removed.

Where appliances approved for installation on floors of combustible construction are set on supports providing not less than four (4) inches open space under the base, are mounted on wood floors, such floors shall be protected with not less than No. 24 U. S. Gauge sheet metal extending at least six (6) inches beyond the appliance on all sides and eighteen (18) inches on side where ashes are removed.

Every heating appliance burning solid or liquid fuel shall be connected to a chimney. (See Section 802.1 (a).

CLEARANCES

There shall be a minimum of eighteen (18) inches clearance between combustible material and heating appliances burning solid or liquid fuel. Should such heating appliance be located with less than eighteen (18) inches clearance from any combustible material, one-hour fire-resistive protection shall be provided as specified in Chapter X, provided however, that those appliances specifically approved for lesser clearances may be installed in accordance with such approval.

SECTION 808 — AUXILIARY EQUIPMENT

Auxiliary equipment used in connection with combustion equipment shall be installed in accordance with good engineering practice and in accordance with the manufacturers recommendations.

SECTION 809 — COMBUSTION EQUIPMENT — GENERAL

809.1 — CAPACITY OF COMBUSTION EQUIPMENT

Combustion equipment shall be of adequate capacity to serve the load without violating good engineering practice.

809.2 — AIR FOR COMBUSTION (SOLID AND LIQUID FUELS)

Combustion equipment shall be installed in a location in which the facilities for ventilation permits satisfactory combustion of the fuel and proper elimination of the products of combustion under normal conditions of use.

The standards set forth in this section shall define the minimum requirements of air for combustion. These standards shall not be decreased, however, manufacturers specifications shall be followed where their requirements exceed these standards. The minimum

dimension of rectangular air ducts shall be not less than three (3) inches.

Operations of exhaust fans, kitchen ventilating systems or fireplaces may create conditions requiring special attention to avoid unsatisfactory combustion equipment operation.

(a) For combustion equipment with an in-put of 400,000 BTU/hr or less located in an equipment room, there shall be provided two openings for supplying combustion air, one to be located near the floor and one to be located near the ceiling of the equipment room, each having an area of not less than one square inch per 1,000 BTU/hr of in-put rating. Such opening shall be directy connected to the outside except as otherwise may be specifically approved by the Building Official.

(b) The size of combustion air openings specified in 809.2 (a) shall not necessarily govern any installation having an in-put in excess of 400,000 BTU per hour. Sizes of openings for such installations shall be in accordance with good engineering practice.

(c) These standards establish requirements for combustion air only, where necessary to prevent space temperatures exceeding 120 degrees Fahrenheit additional ventilation air shall be supplied to the equipment room. Under no circumstances shall equipment rooms be ventilated by any means which would reduce pressures in the space sufficiently to draw gases of combustion from the furnace into the equipment room.

809.3 — ACCESSIBILITY

Combustion equipment shall be located so that it will be readily accessible for operation and servicing.

809.4 — GAS APPLIANCES

Unless otherwise specifically noted, gas appliances shall be installed in accordance with the Southern Standard Buiding Code, Part II, Gas.

809.5 — PERMISSIBLE TEMPERATURES ON COMBUSTIBLE MATERIAL

All combustion equipment and their flue connectors shall be installed so that operation will not create a hazard to persons or property.

Minimum clearances between combustible walls and the back and sides of various conventional types of combustion equipment and their flue connectors shall not be less than as specified elsewhere in this chapter.

809.6 — CLEARANCES

Unless otherwise specifically noted, there shall be a minimum clearance of not less than eighteen (18) inches on all sides from combustible material for heating appliances and their smokepipes burning solid or liquid fuels.

Clearances may be reduced from those specified for water heaters, room or space heaters, central heating boilers and furnaces, floor furnaces, smoke pipes, unit heaters, ceiling-type direct-fired, underfloor horizontal furnaces, restaurant-type cooking appliances, floor-mounted, and low heat industrial appliances in accordance with Table 809.6.

TABLE 809.6 — CLEARANCES, INCHES, WITH SPECIFIED FORMS OF PROTECTION

TYPE OF PROTECTION Applied to the combustible material unless otherwise specified and covering all surfaces within the distance specified as the required clearance with no protection. (See Fig. 1) Thicknesses are minimum.	WHERE THE REQUIRED CLEARANCE WITH NO PROTECTION IS											
	36 Inches			18 Inches			12 In.		9 In.	6 In.		3 In.	
	Above	Sides and Rear	Smoke Pipe	Above	Sides and Rear	Smoke or Vent Pipe	Above	Sides and Rear	Smoke or Vent Pipe	Above	Sides and Rear	Vent Pipe	Above
(a) ¼ in. Asbestos millboard spaced out 1 in.*	30	18	30	15	9	12	9	6	6	3	2	3	2
(b) 28 Gauge sheet metal on ¼ in. asbestos millboard	24	18	24	12	9	12	9	6	4	3	2	2	1
(c) Gauge sheet metal spaced out 1 in.**	18	12	18	9	6	9	6	4	4	2	2	2	2
(d) 28 Gauge sheet metal or ⅛ in. asbestos millboard spaced out 1 in.	18	12	18	9	6	9	6	4	4	2	2	2	2
(e) 1½ in. Asbestos cement covering on heating appliances	18	12	....	9	6	....	6	4	....	2	1	....	1
(f) ¼ in. Asbestos millboard on 1 in. rock-wool bats reinforced with wire mesh or equivalent	18	....	....	6	....	....	4	4	4	2	2	2	2
(g) 22 Gauge sheet metal on 1 in. rock-wool bats reinforced with wire mesh or equivalent	18	....	12	4	....	3	2	2	2	2	2	2	2
(h) ¼ in. Asbestos cement board or ¼ in. asbestos millboard	....	....	....	....	....	....	....	....	....	4	4	4	2
(i) ¼ in. Cellular asbestos	....	....	....	....	....	....	....	....	....	3	3	3	1

*All clearances shall be measured from the outer surface of the appliance to the combustible material disregarding any intervening protection applied to the combustible material. A dash indicates no reduction in clearance permitted.

**Spacers shall be on non-combustible material.

SECTION 810 — WATER HEATERS AND HOT WATER STORAGE TANKS — BURNING SOLID OR LIQUID FUEL

810.1 — PROHIBITED INSTALLATIONS

Water heaters shall not be installed in bathrooms and bedrooms, provided however, water heaters of the automatic storage type may be installed as a replacement in a bathroom, when specifically authorized by the Building Official, provided they are properly flue connected and are supplied with adequate combustion air.

810.2 — LOCATION

Water heaters shall be located as close as practicable to the flue. Water heaters shall be located in an approved ventilated and lighted space so as to be accessible for cleaning and repairing.

810.3 — CLEARANCE

Water heaters shall be positioned in relation to combustible construction with a clearance in accordance with Table 810.3. In no case shall the clearances be such as to interfere with the requirements for combustion air and accessibility.

TABLE 810.3 — MINIMUM CLEARANCES FROM COMBUSTIBLE CONSTRUCTION FOR WATER HEATERS*

	Minimum Clearance (Inches)	
	Sides and Rear	Smoke Pipe
Using Liquid Fuel	12	18
Using Solid Fuel	12	18

*Shall not be installed on floors of combustible construction unless specifically approved for that purpose.

810.4 — CONNECTIONS

Water heaters shall be connected in a manner to permit observation, maintenance and servicing.

810.5 — WATER PRESSURE RELIEF VALVES AND TEMPERATURE RELIEF VALVES REQUIRED

All water heaters shall be provided with an approved self-closing (levered) water pressure relief valve and temperature relief valve or combination thereof. Such valves shall be installed in the shell of the water heater tank or may be installed in the hot water outlet, provided the thermo-bulb extends into the shell of the tank, and in all cases installed at the highest practical point. For installations with separate storage tank, said valves shall all be installed on the

tank and there shall not be any type of valve installed between the water heater and the storage tank. Where, in the opinion of the Building Official, safety valves are required, they shall be installed in accordance therewith.

Temperature and Pressure Relief Valves, or combinations thereof, shall bear the label of the AGA, or ASME, with thermo-setting of not more than 210 degrees F. and pressure setting not to exceed the tank or heater manufacturer's rated working pressure. The relieving capacity of these two devices shall each equal or exceed the heat in-put to the water heater or storage tank.

810.6 — CONNECTION TO BOILER OR TANK

The method of connecting a circulating water heater to the tank shall assure proper circulation of water through the heater, and permit a safe and useful temperature of water to be drawn from the tank.

810.7 — SEDIMENT DRAINS

A suitable water valve or cock, through which sediment may be drawn off or the tank emptied, shall be installed at the bottom of the tank and heater.

810.8 — ANTI-SYPHONING DEVICES

Means acceptable to the Building Official shall be provided to prevent syphoning in any boiler or tank to which any water heater is attached. A cold water tube with a hole near the top is commonly accepted for this purpose.

SECTION 811 — ROOM OR SPACE HEATERS (SOLID AND LIQUID FUELS)

811.1 — CLEARANCE

A room or space heater shall be placed so as not to cause a hazard to walls, floors, curtains, furniture, doors when open, etc., and to the free movements of persons within the room. Appliances designed and marked "For use in incombustible fire-resistive fireplace only," shall not be installed elsewhere. Room or space heaters shall be installed with clearances not less than specified in Table 811.1, except that appliances approved for installations at lesser clearances may be installed in accordance with their approval. In no case shall the clearances be such as to interfere with the requirements of combustion air and accessibility.

TABLE 811.1 — MINIMUM CLEARANCES FROM COMBUSTIBLE CONSTRUCTION FOR ROOM OR SPACE HEATERS*

Type	Miniumum Clearances (Inches) Side and Rear	Smoke Pipe
Space Heaters (Circulating Type burning solid or liquid fuels)	12	18
Space Heaters (other than circulating type burning solid or liquid fuel)	36	18

*Shall not be installed on floors of combustible construction unless specifically approved for that purpose.

811.2 — WALL TYPE ROOM HEATERS (SOLID OR LIQUID FUELS)

Wall type room or space heaters shall not be installed in walls of combustible construction unless specifically approved for such installation.

SECTION 812 — CENTRAL HEATING BOILERS AND FURNACES (SOLIDS OR LIQUID FUELS)

812.1 — CLEARANCES

Central heating boilers and furnaces shall be installed with clearances not less than specified in Table 812.1 except that appliances approved for installation at lesser clearances may be installed in accordance with their approval. In no case shall the clearance be such as to interfere with the requirements for combustion air and accessibility.

TABLE 812.1 — MINIMUM CLEARANCES FROM COMBUSTIBLE CONSTRUCTION FOR CENTRAL HEATING BOILERS AND FURNACES*

	Minimum Clearances (Inches)			
	Above**	Sides and Rear	Front	Smoke Pipe
Mechanical warm air furnaces, automatically fired, with 250 degrees temperature limit control, burning liquid or solid fuel***	6	6	48	18
Hot water and steam boilers operating at not over 15 lbs. gauge pressure, of water-wall type or having a jacket or lining of masonry or other satisfactory insulating material, burning liquid or solid fuel	6	6	48	18
Heating boilers and furnaces (including warm air furnaces other than as above), burning liquid or solid fuel	18	18	48	18

*Shall not be installed on floors of cumbustible construction unless specifically approved for that purpose and shall be installed in accordance with the condition of such approval.

**The clearances above warm air furnaces shall be measured from the furnace bonnet or warm air plenum chamber.

***Mechanical warm air furnaces with 250 deg. F. temperature limit control shall be defined as automatically fired warm air furnaces equipped with a fan to circulate the air and with approved automatic temperature limit controls that cannot be set higher than 250 deg. F. and if coal stoker fired, equipped also with an automatic over-run control to operate the fan when the air reaches a temperature not higher than 250 deg. F. even though the controlling thermostat is not calling for heat.

812.2 — ERECTING AND MOUNTING

A central heating boiler or furnace shall be erected in accordance with the manufacturer's instructions and shall be installed on a firm level, fire-resistive floor unless approved for installation on a combustible floor, or the floor is protected in a manner acceptable to the Building Official.

812.3 — ACCESSIBILITY

The installation of central heating boilers and furnaces shall be such as to make them accessible for cleaning of heating surfaces, removal of burners and/or stokers, replacement of sections, motors, controls, filters, and other working parts and for adjustment and lubrication of parts requiring such attention.

812.4 — CONNECTION OF FLOW AND RETURN PIPES TO BOILERS

The method of connecting the flow and return pipes on steam and hot water boilers shall facilitate a rapid circulation of steam or water. For common piping systems reference may be made to the American Society of Heating and Ventilating Engineers — Heating. Ventilating, Air Conditioning Guide and to the Institute of Boiler and Radiator Manufacturer's (IBR) Guides.

812.5 — FEED WATER AND DRAIN CONNECTION TO BOILERS

A steam or hot water boiler shall be provided with a direct connection to a water supply through an individual control valve. A drain valve, by means of which the boiler may be flushed or drained, shall also be provided.

812.6 — TEMPERATURE AND PRESSURE CONTROL DEVICES AND PRESSURE RELIEF DEVICES ON BOILERS

Steam and hot water boilers shall be provided with automatic devices, approved by the Building Official, to shut down the burners

and/or stokers in the event of undue pressure or low water or in the event of overheating in a hot water boiler. Each automatically fired steam or hot water boiler shall be provided with a high limit shutoff and a separate operating shutoff in conjunction with other controls for the firing or operating controls.

Steam and hot water boilers shall be fully safeguarded by means of ASME approved pressure relief devices complying with the ASME Boiler Code.

812.7 — PLENUM CHAMBERS AND AIR DUCTS

A plenum chamber when not a part of a furnace shall be constructed in accordance with the manufacturer's instructions. Reference may be made to the Standards of the National Fire Protection Association for the Installation of Air Conditioning Warm Air Heating, Air Cooling and Ventilating Systems, (NFPA Pamphlet No. 90—August, 1952) and to the Design and Installation Manuals of the National Warm Air Heating and Air Conditioning Association.

812.8 — RETURN AIR CONNECTIONS

Return air connections in the furnace room or directly below the furnace room shall be made so as to preclude any possibility of air being drawn from the furnace room into the return air duct by action of the furnace fan.

812.9 — FURNACES USED WITH REFRIGERATION SYSTEMS AND BLOWERS

A furnace when used in conjunction with a refrigeration system shall be installed on a discharge side of the blower. The furnace shall be installed parallel with or on the air inlet side of the refrigeration coil. If the refrigerating coil is installed in the air discharge duct from the furnace, this coil shall be installed in or provided with a by-pass duct unless the furnace is listed for operation with at least 0.5" static pressure at the outlet air connection.

812.10 — DUCT CONNECTIONS

All flexible duct connections shall be made of fire-resistant materials.

SECTION 813 — FLOOR FURNACES (SOLID OR LIQUID FUELS)

813.1 — INSTALLATION

Floor furnaces shall not be installed in floors of combustible construction unless approved specifically for such installation by a recognized laboratory and are installed in accordance with the condition of such.

813.2 — COMBUSTION AIR

Fixed ventilation by means of a duct or grill arranged to supply air from a permanently ventilated attic or underfloor space, shall be provided in accordance with Section 809.2.

813.3 — PLACEMENT

The following are requirements that will serve in properly placing the furnace or furnaces to serve one story:

(a) No floor furnace shall be installed in the floor of any aisle or passageway of any auditorium, public hall, or place of assembly, or in any exitway from any such room or space.

(b) Walls and Corner — With the exception of wall-register models, a floor furnace shall not be placed closer than six (6) inches to a wall or corner.

(c) The furnace shall be so placed that a drapery or similar object cannot be nearer than twelve inches to any portion of the furnace. Floor furnace shall not be installed in concrete floor construction built on ground. No door or doors that can be closed shall be permitted between the floor furnace installation and the controlling themostat, unless a high limit control thermostat is installed in the same room as the floor furnace; nor shall any floor furnace be installed in such a manner that will permit any door to swing over it.

813.4 — PROHIBITED LOCATION

Floor furnaces shall not be installed above the ground floor of any building.

813.5 — BRACING

The floor around the furnace shall be braced and headed with an adequate frame work of material not smaller in dimension than the joists.

813.6 — SUPPORT

Means shall be provided to support the furnace when the floor grille is removed.

813.7 — CLEARANCE

The lowest portion of the floor furnace shall have at least a twelve (12) inch clearance from the general ground level. When this clearance is not present, the ground below and to the sides shall be excavated to form a "basin-like" pit under the furnace so that the required clearance is provided beneath the lowest portion of the furnace. Said pit shall have masonry or concrete floors and walls, with walls being not less than four (4) inches above ground level

and a self-operating floor drain installed. Not less than an eighteen (18) inch clearance shall be provided on all sides except the control side, which shall have a minimum twenty-four (24) inch clearance.

813.8 — ACCESS

Provision shall be made for access to the floor furnace by means of an opening in the foundation wall of at least twenty-four (24) by thirty (30) inches or through a trap door of at least twenty-four (24) by thirty (30) inches, located at some convenient point, and a clear and unobstructed passageway to the floor furnace of at least twenty-four (24) inches high by thirty (30) inches wide.

813.9 — WIND PROTECTION

Floor furnaces shall be protected, where necessary, against severe wind conditions.

813.10 — FLUE CONNECTION

Except as hereinafter otherwise provided, floor furnace smoke pipes shall be installed with clearances to woodwork or other combustible material whether plastered or unplastered, of not less than eighteen (18) inches.

SECTION 814 — ATTIC FURNACES (SOLID OR LIQUID FUELS)

Heating furnaces shall not be installed in attics unless specific written approval has been given by the Building Official, and such installation shall be made in accordance with terms of such approval.

SECTION 815 — UNIT HEATERS, CEILING-TYPE, DIRECT-FIRED (SOLID OR LIQUID FUELS)

815.1 — SUPPORT

Unit heaters shall be safely and adequately supported with due consideration given to their weight and vibration characteristics.

815.2 — CLEARANCES

Except as hereinafter otherwise provided, ceiling-type direct-fired unit heaters shall be installed to provide a clearance in any direction to woodwork or other combustible material whether plastered or unplastered, of not less than eighteen (18) inches.

815.3 — DUCTWORK

A unit heater shall not be attached to a warm air duct system unless approved for such installation.

815.4 — GARAGE INSTALLATION

Unit heaters installed in Commercial garages, (Maintenance, Repair, Storage) or in airplane hangars shall be installed at least eight (8) feet above the floor.

SECTION 816 — UNDERFLOOR HORIZONTAL FURNACES (SOLID OR LIQUID FUELS)

816.1 — INSTALLATION

Underfloor horizontal furnaces shall not be installed unless of a type approved for such installation with clearances provided as specified in Section 812.

816.2 — COMBUSTION AIR

Fixed ventilation by means of a duct or grille arranged to supply air from a permanently ventilated underfloor space, shall be provided in accordance with Section 809.2.

816.3 — SUPPORT

The underfloor horizontal furnace shall be placed on masonry supports that shall be permanently placed, or suspended from overhead structural members of adequate strength by means of hanger rods as recommended by the manufacturer.

816.4 — CLEARANCE

Underfloor horizontal furnaces mounted less than twelve (12) inches vertical from the earth shall be placed over a concrete slab of not less than four (4) inches thickness with a clearance between the top of the concrete slab and the lowest portion of the furnace of not less than six (6) inches. The concrete slab shall provide walls extending not less than four (4) inches above the general ground level and clearance between the furnace and the walls shall be not less than eighteen (18) inches on all sides except the control side which shall have a twenty-four (24) inch clearance. If the top of the concrete slab is located below the general ground level a self-operating floor drain shall be provided.

816.5 — ACCESS

Provisions shall be made for access to the underfloor horizontal furnace by means of an opening in the foundation wall of at least twenty-four (24) by thirty (30) inches or through a trap door of at least twenty-four (24) by thirty (30) inches, located at some convenient point, and a clear and unobstructed passageway to the furnace of at least twenty-four (24) inches high by thirty (30) inches wide.

816.6 — WIND PROTECTION

Underfloor horizontal furnaces shall be protected, where necessary, against severe wind conditions.

SECTION 817 — HEATING, AIR CONDITIONING AND VENTILATING DUCTS

This section applies to air conditioning, warm air heating, air cooling and ventilating systems employing either gravity or mechanical means for the movement of air through ducts. For ventilating systems for the removal of dust, smoke, fumes, gases, vapors, odors or other hazardous, obnoxious, or injurious impurities see Section 2001.1.

817.1 — MATERIALS

All air ducts shall be constructed entirely of iron, steel or other approved non-combustible material. Only approved non-combustible material or approved fire-resistive linings shall be used inside of ducts.

Work involving torches shall not be undertaken on ducts until the system has been shut down, the duct cleaned and all combustible lining and covering material has been removed from the portion being repaired.

Ducts shall be so constructed as to provide ample strength to meet the conditions of service for which they are used. In no case shall their structural strength and durability be less than the equivalent of galvanized sheet iron or steel of the thickness indicated in Table 817. Wire glass may be used for inspection windows in ducts.

TABLE 817 — THICKNESS OF METAL FOR AIR DUCTS

Round Ducts Diameter (Inches)	Rectangular Ducts Width (Inches)	Minimum Thickness U. S. Gauge
Up to 18	Up to 12	26*
Over 18 to 30	Over 12 to 30	24*
Over 30 to 45	Over 30 to 48	22
Over 45 to 60	Over 48 to 60	20
60 and above	60 and above	18

*In 1-and 2-family dwellings these gauges may be changed to 28 gauge and 26 gauge respectively.

817.2 — FIRE PROTECTION

If ducts are formed by parts of the building structure, their construction shall consist of not less than three-quarter (¾) inch

cement or gypsum plaster on metal lath or equivalent protection, applied to those parts, if such parts are combustible.

Ducts shall be tight throughout with no openings except those essential to the required function of the system. Ducts shall be substantially supported by metal hangers or brackets.

Where ducts pass through walls, floors or partitions, the space around the duct shall be sealed with rope asbestos, mineral wool or other non-combustible material to prevent the passage of flame and smoke.

Where ducts pass through concealed ceiling spaces of combustible construction or are located inside combustible partitions or walls, either the ducts or the interior surface of such enclosing space shall be protected with one-quarter (¼) inch asbestos or other equivalent approved insulating material, or a minimum clearance of one-half (½) inch shall be provided. However, warm air ducts which run approximately horizontal near combustible construction which is either plastered or unplastered, shall have a clearance of not less than six (6) inches except that the minimum clearance shall be one (1) inch where ducts are of metal covered with one-half (½) inch or more of approved non-combustible insulating material.

Where ducts pass through floors, (except in the case of dwellings) fire protection shall be provided as specified in Section 701 — Protection of Vertical Openings. Such construction, however, shall not be required for branches which are cut off from the main duct by approved fire dampers.

817.3 — RETURN AND SUPPLY DUCTS

Return ducts, and supply ducts, unless air passes through either water spray or filters, other than vertical, shall be so constructed that their interior is accessible for cleaning except that the Building Official may waive this requirement if the occupancy is not productive of lint, greasy vapors, or other combustibles. (For occupancies such as banks, office buildings, churches, institutions and hotels, the requirements may be waived except for kitchens, service rooms, and rooms used for manufacturing purposes.)

Ducts shall not pass through fire walls unless unavoidable; in such cases approved automatic fire doors or shutters shall be provided on both sides of the wall. On such wall openings not exceeding eighteen (18) inches in diameter, three-eighths (⅜) inch steel plates may be used as fire doors.

Fresh air intakes shall be protected against exterior fire and smoke exposure by approved doors, dampers or other protectives.

No room, attic, void, hollow or concealed space shall be used as an integral part of a duct system, unless the component parts of such space is constructed entirely of non-combustible material, properly protected by means of fire-damper or controls so as to restrict the

spread of fire, and arranged so as to protect the fire-resistiveness of the assembly.

Public corridors shall not be used as a return plenum in hotels, multi-family residences and institutional occupancies.

Structural members of a building may be used as a duct to carry air provided such members are designed to fully satisfy the structural and fire requirements of this code, and are of non-combustible material and are properly designed, engineered and installed to provide a continuous duct of proper size.

Duct systems shall be constructed and installed to meet the "Standards of the National Fire Protection Association for the Installation of Air Conditioning, Warm Air Heating, Air Cooling and Ventilating Systems" (NBFU Pamphlet 90, 1952) except as otherwise provided herein.

817.4 — UNDER FLOOR SLAB AIR DUCTS — GROUND LEVEL

Where air ducts are used under concrete floor slabs at ground level, careful preparation of site shall be exercised to insure a well-drained and continuously dry condition. All organic material shall be removed.

The slab shall be laid over a coarse fill of not less than six (6) inches in thickness. In no case shall sand, cinders or unscreened rock or gravel be used as a filler.

Ducts shall be of non-combustible material, corrosive-resistant and shall have a compressive strength of not less than three hundred (300) pounds per lineal foot.

CHAPTER IX

SPRINKLERS AND STANDPIPES

SECTION 901 — SPRINKLERS

Where required in this code, only approved sprinklers shall be used in automatic sprinkler systems and the complete layout of the system shall be approved by the Building Official before installation is made.

Every automatic sprinkler system required by this code shall conform with the requirements of the "Standards of the National Fire Protection Association for the Installation of Sprinkler Equipment," (National Fire Codes, Volume IV, 1946 Edition), except that a single water supply of adequate pressure, capacity and reliability, equal to the primary supply required by those Standards, may be permitted by the Building Official.

For the purpose of application of the "National Fire Protection Standards for Sprinkler Equipment," occupancies of Groups A, B, C, D and E shall be considered as "Light Hazard Occupancies", of Groups F and G as "Ordinary Hazard Occupancies", of Group H as "Extra Hazard Occupancies."

Piping shall be of wrought iron or steel. Sprinkler systems shall be designed to withstand, under service conditions, a water pressure of not less than 200 lbs. per square inch for 2 hours without leakage and shall be tested in the presence of the Building Official before final approval and acceptance.

Only approved sprinklers, fittings, connections and valves shall be used in the installation of sprinkler systems.

Every sprinkler system shall be provided with an approved outside screw and yoke valve or indicator gate valve, in an accessible location, to control all sources of water supply other than that from the fire department connection.

All hose threads in connections shall be uniform with that used by the fire department of the city.

In addition to the requirements specified elsewhere in this code, approved automatic sprinkler equipment meeting the requirements of this Section shall be installed in buildings as follows:

In basements or cellars with ceiling less than 4 Ft., 6 In. above grade, having floor areas exceeding 3,500 square feet when used as workshops or for the manufacture, repair, sale or storage of combustible materials shall be equipped with approved automatic sprinkler systems, except that in Group A: Residential, Group C: Schools, and Group D: Institutional Buildings, only those portions need be sprinklered that are used for such purposes.

In garages approved automatic sprinklers shall be provided as follows:

1. In garages having an area exceeding 5,000 square feet and used for the storage of loaded commercial trucks.

2. In bus garages exceeding 2 stories in height.

3. In basement or sub-basement garages housing more than three motor vehicles.

4. In garages located in buildings in which parts thereof above such garages are occupied for other purposes, where such garages have a capacity of 20 or more automobiles, or are used as terminals for three or more buses, or are used for storage or loading of three or more trucks.

In occupancies of Group E: Theaters and Assembly, (except Stadiums and Grand Stands). (See Section 510), sprinkler equipment shall be provided as specified in Section 512.23.

Film exchanges, laboratories, and studios shall be equipped with approved automatic sprinkler systems as required in Section 501.3 (a).

In buildings of Group H: High Hazard Occupancies, sprinklers shall be installed as required in Section 501.2 (d).

All sub-basement rooms exceeding 2,500 square feet in area, except machinery rooms of construction other than Type I: Fireproof, shall have approved automatic sprinkler equipment.

Sprinkler equipment shall also be provided in stores and similar Group B Occupancies where stocks of combustible materials are on display for public sale and where the allowable story floor area exceeds 20,000 Sq. Ft. and in buildings other than herein specified, where because of the high fire hazard represented by their combustible content or by their use, such protection is deemed necessary by the Building Official.

*See Sections 404 through 411 for area limitations.

SECTION 902 — STANDPIPES

902.1 — WET STANDPIPES

Wet standpipes for the purpose of this code, shall be those which have a primary water supply constantly available at every hose outlet or made available automatically when the hose valve at any outlet is opened or when a control station functions.

902.2 — DRY STANDPIPES

Dry standpipes for the purpose of this code, shall be those having no permanent or automatic water supply. They are intended for supply and use by the fire department.

902.3 — WHERE REQUIRED

In buildings of Group E: Theater or Assembly, and of Group H: High Hazard Occupancies, and in those buildings where standpipes are required by other sections of this code, wet standpipes shall be provided.

Wet standpipes shall also be provided in all buildings over 55 feet in height except that in such buildings where in the opinion of the Building Official and of the Chief of the Fire Department such constant and automatic water supply is not necessary because of the occupancy and type of construction, with their approval dry standpipes may be substituted for one or more of the required wet standpipes.

For standpipe requirements in Group E: Theater or Assembly Occupancies see Section 512.24.

902.4 — NUMBER OF STANDPIPES

The number of wet standpipes shall be such that a nozzle attached to 100 feet of one and one-half (1½) inch hose connected to a two and one-half (2½) inch standpipe, will reach to within 30 feet of all parts of the floor area.

902.5 — LOCATION OF STANDPIPES

Standpipes shall extend from the lowest story of the building to the topmost story and shall be so located that they are protected against mechanical and fire damage, with outlets within or without stairway enclosures; and standpipes shall be installed floor by floor as building increases in height during erection. Provided that in buildings heretofore erected in which the stairways are not enclosed, the standpipe outlets shall be located as near the stairway as possible or they shall be outside or immediately inside of the exterior walls, within one foot of a fire tower, exterior stairway or fire escape.

902.6 — CONSTRUCTION

Unless otherwise provided herein, standpipes, standpipe systems, hose, water supply, pumps, connections, etc. shall be constructed and installed to meet the "Regulations of the National Board of Fire Underwriters for the Installation of Standpipe and Hose Systems," except that a single source of water supply, if reliable and capable of automatically supplying the required service, may be approved by the Building Official.

Standpipes shall be constructed of wrought iron or steel with approved fittings, connections and valves, and shall be designed to withstand a working pressure of not less than 100 Lbs. per square inch in excess of the static head of water due to the height of the standpipe.

Minimum diameter of standpipes shall be not less than four (4) inches except that it shall be not less than six (6) inches in buildings exceeding seventy-five (75) feet in height.

Standpipes shall be equipped in every story with 2½ inch hose connections, and valves located not more than five (5) feet above the floor level. All hose threads in connections shall be uniform with that used by the fire department of this city. Each standpipe shall be equipped with a Siamese fire department inlet connection located on a street front of the building not less than eighteen (18) inches or more than thirty-six (36) inches above the grade level. The pipe from the standpipe to the Siamese connection shall be at least four (4) inches diameter. Stop valves or check valves shall be provided to permit cutting off any standpipe riser without interrupting the supply to other risers from some source of supply. Approved provision shall be made to prevent freezing.

Where more than one wet standpipe is installed in a building they shall be connected at their bases by pipes of a size equal to that of the largest standpipe.

902.7 — SIGNS

Each outside connection shall be marked to identify its use by a metal sign rigidly attached to the building having raised letters reading "Connection to Wet Standpipe" or "Connection to Dry Standpipe", as the case may be.

902.8 — HOSE

Sufficient hose for dry standpipes shall be provided to reach all parts of floor area served by standpipe, but not in excess of 75 feet of one and one-half (1½) inch hose attached to each outlet.

902.9 — DRY STANDPIPES REQUIRED

In buildings 55 ft. or more in height there shall be at least one dry standpipe. One additional dry standpipe shall be provided, for each 10,000 Sq. Ft., or fraction thereof, by which the area of any floor above the second floor exceeds 10,000 Sq. Ft., in area.

CHAPTER X

FIRE RESISTANCE RATINGS FOR MATERIALS AND CONSTRUCTION

1001 — GENERAL

Fire protection requirements of this Code are based on fire-resistance ratings. Such ratings are established in this Chapter for various building materials, assemblies and thicknesses. Other materials, thicknesses, assemblies and construction of necessary strength and durability for the use intended, which have successfully performed under tests made by a recognized laboratory, in accordance with the requirements of the "Standard Methods of Fire Tests of Building Construction and Materials" (E119-58) of The American Society for Testing Materials shall be accepted by the Building Official for specific ratings in lieu of those prescribed in this Chapter of the Code. All Ceilings or Ceiling Assemblies shall have a hose stream applied at the end of the fire endurance test, in accordance with "ASTM (E119-58) Standard Methods of Fire Tests of Building Construction and Materials.

Thicknesses as established in this Chapter shall be construed as establishing minimum requirements for fire-resistance only, and shall not preclude the application of other requirements of this Code, where consideration of strength, durability or stability require greater thicknesses.

No combustible materials shall enter into the construction of assemblies except as hereinafter provided or otherwise accepted on the basis of the foregoing prescribed tests.

Fire doors, curtains, shutters, windows, or other protection required for openings in fire resistive walls, shall be in accordance with the requirements of Section 703.

Roof coverings shall conform to the requirements prescribed in Section 301.3(d) and in Section 706.

1001.1 — MATERIALS FOR FIRE PROTECTION

Materials prescribed for the fire-resistance ratings assigned in this chapter shall conform with the requirements of this section.

1001.2 — CONCRETE

Concrete used for fire-protection shall consist of one part (by volume) portland cement and not more than two parts of sand and four parts of approved aggregate, not over ¾" diameter, reinforced with wire or metal fabric.

Grade A Concrete is concrete in which the coarse aggregate consists of blast-furnace slag, limestone, calcareous gravel, trap rock,

burnt clay or shale, cinders containing not more than 25% of combustible material and not more than 5% of volatile material, and other materials meeting the requirements of this Code and containing not more than 30% quartz, chert, flint, and similar materials.

Grade B Concrete is concrete in which the coarse aggregate consists of granite, quartzite, siliceous gravel, sandstone, gneiss, cinders containing more than 25% but not more than 40% of combustible material and not more than 5% of volatile material, and other materials meeting the requirements of this Code and containing more than 30% quartz, chert, flint, and similar materials.

1001.3 — BRICKWORK

Bonded brickwork shall be laid in portland cement mortar, portland cement-lime mortar, or lime mortar. Clay and shale brick shall conform to the American Society for Testing Materials "Standard Specifications for Building Brick (Solid Masonry Units Made From Clay or Shale)" (ASTM C62-58). Concrete brick shall conform to the American Society for Testing Materials "Standard Specifications for Concrete Building Brick" (ASTM C55-55). Sand-lime brick shall conform to the American Society for Testing Materials "Standard Specifications for Sand-Lime Building Brick" (ASTM C73-51).

1001.4 — CLAY OR SHALE TILE

Hollow clay or shale tile shall be laid in portland cement mortar, portland cement-lime mortar, lime mortar, or gypsum mortar. Used in non-bearing partitions, and for fire-proofing, clay or shale tile shall meet the requirements of the American Society for Testing Materials "Standard Specifications for Structural Clay Non-Load Bearing Tile" (ASTM C56-57). Clay or shale tile used in exterior walls and in all load-bearing walls or load-bearing partitions, shall comply with the requirements of the American Society for Testing Materials "Standard Specifications for Structural Clay Load-Bearing Wall Tile" (ASTM C34-57).

1001.5 — GYPSUM

Gypsum partition tile blocks shall contain not more than 12½ per cent by weight of binding material, shall be laid in gypsum mortar, and shall meet the requirements of the American Society for Testing Materials "Standard Specifications for Gypsum Partition Tile or Block" (ASTM C52-54).

Poured gypsum used for fire-proofing and floor and roof construction shall contain not more than 12½ per cent of wood chips, shavings or fiber, measured in a dry condition, as a percentage, by weight, of the dry mix. Gypsum mortar shall be composed of one part gypsum and not more than three parts clean, sharp, well-graded sand, by weight.

Fibered plaster may be used where unsanded or neat gypsum plaster is prescribed.

All plaster mixes for sanded gypsum plasters shall be measured by dry weight.

When vermiculite or perlite is used as an aggregate in plaster the scratch coat shall be mixed in the proportion of 100 lbs. of gypsum neat plaster to not more than 2 cu. ft. of vermiculite or perlite aggregate and the brown coat shall be mixed in the proportion of 100 lbs. of gypsum neat plaster to not more than 3 cu. ft. of vermiculite or perlite except as may be otherwise permitted or prescribed in this code.

1001.6 — GYPSUM LATH, GYPSUM WALLBOARD, AND GYPSUM SHEATHING BOARD

Gypsum lath shall comply with the provisions of the American Society for Testing Materials "Standard Specifications for Gypsum Lath" (ASTM Designation C37-54). Perforated gypsum lath shall have perforations not less than ¾" in diameter, with one perforation for not more than 16 square inches of lath surface.

Gypsum lath shall be nailed to wood studs or joists in all constructions required to be fire-resistive, with No. 13 gage, 1⅛", 19/64" flat-head blued nails at intervals not exceeding 4" on centers, (Five nails per lath for support of 16 inch lath), or equivalent attachment.

Gypsum wallboard shall comply with the provisions of the American Society for Testing Materials "Standard Specifications for Gypsum Wallboard" (ASTM Designation C36-58).

Gypsum sheathing board shall comply with the provisions of the American Society for Testing Materials "Standard Specifications for Gypsum Sheathing Board" (ASTM Designation C79-54).

1001.7 — METAL OR WIRE LATH

Wherever metal lath or wire lath and plaster are used as required protection against the spread of fire, the weight of lath shall be not less than 2.5 lbs. per square yard when used in vertical position, and not less than 2.75 lbs. per square yard when used in horizontal position. Wire lath shall be not lighter than 2½ meshes per inch, or equivalent.

Weight tags shall be left on all metal lath or wire lath until inspected and approved by the Building Official.

Metal lath for ceilings below wood joists in construction which is required to be fire-resistive shall be attached with 1½", 11 gage, 7/16" head barbed roofing nails spaced at intervals not to exceed 6" on centers, or equivalent attachment.

Whenever the word wire lath is used in fire-resistive plastering it shall not preclude the use of paper back wire lath. Whenever paper back wire lath is used it shall be in accordance with the Requirements for Paper-Backed Wire Fabric as prescribed in Chapter XVIII of this Code.

1001.8 — CONCRETE BLOCKS

Hollow concrete masonry units used in exterior walls and in all walls or partitions shall comply with the requirements of the American Society for Testing Materials "Standard Specifications for Hollow Load-Bearing Concrete Masonry Units" (ASTM C90-59 and Non-Load Bearing C129-59).

1001.9 — VERMICULITE

Vermiculite, when used as an aggregate with plaster, shall conform in particle size to the American Society for Testing Materials "Standard Specifications for Inorganic Aggregates for use in Gypsum Plaster" (ASTM C35-59). The weight of vermiculite shall be not less than 6 nor more than 10 lbs. per cu. ft., as determined by measurement in a cubic-foot box, using the shoveling procedure as outlined in the American Society for Testing Materials "Tentative Method of Test for Unit Weight of Aggregate" (ASTM C29-55T).

1001.10 — PERLITE

Perlite, when used as an aggregate with plaster, shall conform in particle size to the American Society for Testing Materials "Standard Specifications for Inorganic Aggregates for use in Gypsum Plaster" (ASTM C35-59). The weight of perlite shall be not less than 7½ nor more than 15 lbs. per cu. ft., as determined by measurement in a cubic-foot box, using the shoveling procedure as outlined in the American Society for Testing Materials "Tentative Method of Test for Unit Weight of Aggregate" (ASTM C29-55T).

SECTION 1002 — FIRE RESISTANCE RATINGS FOR NON-LOAD BEARING WALLS AND PARTITIONS

Fire-resistance ratings for non-bearing walls and partitions shall be in accordance with this section.

TABLE 1002 (a) — FIRE-RESISTANCE RATINGS FOR NON-LOAD BEARING WALLS AND PARTITIONS

WALL ASSEMBLIES	MINIMUM NOMINAL THICKNESS For Fire Ratings Indicated (Inches) 4-Hr.	3-Hr.	2-Hr.	1-Hr.
BRICK WALLS—Clay, Shale, Concrete or Sand-Lime.				
Solid-Unplastered	8	8	8	4
—½" Plaster on both sides	8	8	4	....
BRICK WALLS				
Hollow—Plastered or Unplastered	12	....	8	....
—Plastered on both sides	8	....	....	....
—Hollow Rolok-Bak; Plastered	8	....	....	....
CONCRETE—Plastered and Unplastered 0.2% reinforcement in each direction; ¾" max. size aggregate	6	5	4	3
—Plastered both sides	6	5	3	3
HOLLOW CLAY TILE				
—Plastered or unplastered 2-units; 3 cells in wall thickness	12	....	....	....
2-units; 4 cells in wall thickness	....	8	....	....
3-cells; in wall thickness	....	12	8	....
3-interior cells and double shells	....	....	8	....
T-shaped 2 cells in wall thickness	....	....	8	....
—Plastered 2-cells in wall thickness, both sides	8	....	6	....
2-cells in wall thickness, one side	....	....	8	....
Plastered both sides	....	....	....	4

TABLE 1002 (a) (Continued)

HOLLOW CLAY OR CONCRETE TILE, BRICK FACED WALLS

WALL ASSEMBLIES	4-Hr.	3-Hr.	2-Hr.	1-Hr.
Tile units bond to 4 inch. Brick facing, having 5/8" 1:3 Plaster applied to tile, total masonry thickness	12			
STONE MASONRY-SOLID WALLS				
Plastered or Unplastered	12	....	....	8
HOLLOW CONCRETE MASONRY UNITS				
Aggregates				
Volcanic Pumice Expanded Slag Air-Cooled Slag Burned Clay or Shale				
Unplastered	6-2 8-1½*	8-1½	6-1⅜ 8-1¼	4-1**
Plaster on one side		6-1⅜ 8-1¼	4-1 5/16 6-1⅛	3-1
Plaster on both sides		4-1 5/16 6-1⅛	3-1	
OTHER AGGREGATES				
Unplastered	8-2¼ 12-1¾	6-2 8-1¾	8-1⅜	4-1
Plaster on one side			4-1 5/16	3-1
Plaster on one side	6-2 8-1¾	8-1⅜	4-1	

NOTE—In each pair of numbers, the first numeral is thickness of wall and second numeral is thickness of face shell.

* Must be plastered one side for burned clay or shale aggregate.

** Two-hour rating for volcanic pumice aggregate.

TABLE 1002(b) — FIRE-RESISTANCE RATINGS FOR NON-LOAD-BEARING WALLS AND PARTITIONS

WALL OR PARTITION ASSEMBLY			Fire Resistance Ratings
SOLID PLASTER PARTITIONS		Total thickness of partition:—	
Solid Plaster Steel-Framed Partitions	Plaster applied to metal lath (except as noted) supported on ¾" steel channel studs.	2" unsanded gypsum plaster.	2-Hr.
		2½" vermiculite - gypsum or perlite - gypsum plaster.	2-Hr.
		2" sanded gypsum plaster (mix 1:½).	1½-Hr.
		2" vermiculite - gypsum or perlite - gypsum plaster.	1-Hr.
		2" sanded gypsum plaster (mix 1:2).	1-Hr.
		2½" sanded gypsum plaster (mix 1:2, 1:3) on metal lath or paper-backed wire fabric.	1-Hr.
Solid Plaster Studless Partitions	1" plaster applied to each side of ½" long length plain gypsum lath inserted at top and bottom in steel or other non - combustible runners.	Total thickness of partition:— 2½" vermiculite - gypsum or perlite - gypsum plaster.	2-Hr.
	¾" plaster applied to each side of ½" long-length plain gypsum lath inserted at top and bottom in steel or other non - combustible runners.	Total thickness of partition:— 2" vermiculite - gypsum or perlite - gypsum plaster.	1-Hr.

Table 1002(b) (Continued)

	Plaster applied to each side of diamond mesh or rib metal lath fastened top and bottom in steel or other non-combustible runners.	Total thicknes of partition:— 2" sanded gypsum plaster (mix 1:2).	1-Hr.
	13/16" plaster applied to each side of ⅜" or ¾" plaster applied to each side of ½" long length plain gypsum lath inserted at top and bottom in steel or other non - combustible runners.	Total thickness of partition:— 2" sanded gypsum plaster (mix 1:1, 1:2).	1-Hr.
Hollow Steel Framed Construction			
Steel Stud Hollow Partitions	Steel studs to both faces of which is attached plaster applied over face of metal lath with not less than 2" air space between inside faces of lath.	Each face—⅞" unsanded gypsum plaster.	2½-Hr.
		⅞" vermiculite gypsum or perlite gypsum plaster.	2-Hr.
		¾" unsanded gypsum plaster or ⅞" sanded gypsum plaster (mix 1:½).	2-Hr.
		¾" sanded gypsum plaster (mix 1:½") or ⅝" unsanded gypsum plaster.	1½-Hr.
		⅝" sanded gypsum plaster (mix 1:2).	1-Hr.
		¾" sanded gypsum plaster (mix 1:2, 1:3)	1-Hr.
		¾" sanded portland cement-asbestos fiber plaster (mix 1:2, 1:3-3 lb. asbestos fiber per bag of cement).	1-Hr.

Table 1002(b) (Continued)

	Steel studs to both faces of which is attached plaster applied to ⅜" perforated gypsum lath (the lath shall be fastened to the studs by approved wire clips supporting the lath fully across its face), with not less than 2" air space between inside faces of lath.	Each face—½" vermiculite-gypsum or perlite - gypsum plaster (mix 2½ cu. ft. of aggregate per 100 lbs. gypsum).	1-Hr.
		½" sanded gypsum plaster (mix 1:2).	1-Hr.
Masonry Walls and Partitions			
Hollow Structural Clay Tile Partitions	Shale tile or dense hard-burned clay tile unplastered.	Thickness of Partition: 4 inches (Units not less than 40% solid)[2].	1-Hr.
		6 inches (Units not less than 30% solid)[2].	2-Hr.
	⅝" (1:3) sanded gypsum plaster on each side.	Thickness of Partition: 4 inches[1] (Units not less than 50% solid).	1-Hr.
		6 inches[1] (Units not less than 30% solid).	1-Hr.
		4 inches[1] (Units not less than 40% solid)[2].	2-Hr.
		6 inches[1] (Units not less than 30% solid)[2].	3-Hr.
	Medium - burned clay tile unplastered.	6 inches (Units not less than 45% solid). (Two cells in wall thickness).	1-Hr.
		6 inches (Units not less than 30% solid)[2].	2-Hr.
	⅝" (1:3) sanded gypsum plaster on each side.	3 inches[1] (Units not less than 50% solid).	1-Hr.
		6 inches[1] (Units not less than 30% solid).	1-Hr.
		4 inches[1] (Units not less than 60% solid). (Two cells in wall thickness).	2-Hr.
		6 inches[1] (Units not less than 30% solid)[2].	3-Hr.

Table 1002(b) (Continued)

Gypsum Block Partitions	Solid block unplastered.	Thickness of Partition: 2 inches (Units not less than 100% solid). 3 inches (Units not less than 100% solid). 5 inches (Units not less than 100% solid).	 1-Hr. 3-Hr. 4-Hr.
	Hollow block unplastered.	Thickness of Partition: 3 inches (Units not less than 70% solid).	 1-Hr.
	Hollow block ½" (1:3) sanded gypsum plaster on either side.	4 inches[1] (Units not less than 70% solid).	3-Hr.
	Hollow block ½" (1:3) sanded gypsum plaster on each side.	3 inches[1] (Units not less than 70% solid). 4 inches[1] (Units not less than 70% solid).	3-Hr. 4-Hr.
Perlite Concrete Masonry Walls	Hollow perlite concrete masonry units with cores filled with perlite concrete mortar unplastered.	Thickness of Wall: 4 inches.	 4-Hr.
Lightweight Concrete Panel or Curtain Wall	Exterior Section — 4" perlite-portland cement concrete applied on paper-backed wire fabric encasing steel framing members and Interior Section — Channel furred section comprising a 1" air space and 1" perlite-gypsum plaster applied on paper-backed wire fabric.	Thickness of Wall: 6 inches[3].	 4-Hr.

Table 1002(b) (Continued)

	Vermiculite - portland cement concrete applied to paper-backed wire fabric spaced 1½" from (1½" x 1½") steel channels, 2' on centers. Concrete encasing channels.	Thickness of Wall: 4 inches.	4-Hr.

Footnotes: [1]Thickness of partition (not including plaster).

[2]Cells filled with broken tile, stone, slag, cinders or sand mixed with mortar.

[3]Total thickness of partition, including plaster.

SECTION 1003 — FIRE RESISTANCE RATINGS FOR LOAD BEARING WALLS AND PARTITIONS

The fire-resistance of load-bearing walls and partitions shall be rated in accordance with this section and Table 1003(a) and Table 1003(b), except as provided in Section 1001. See also the Reference Notes and General Requirements which follow Table 1003 (b).

TABLE 1003(a) — FIRE-RESISTANCE RATINGS FOR LOAD-BEARING MASONRY WALLS AND PARTITIONS

MINIMUM NOMINAL THICKNESS (In Inches) FOR FIRE-RESISTANCE RATINGS INDICATED

WALL OR PARTITION ASSEMBLY		Members Framed Into Wall or Partition							
		Combustible				None or Non-Combustible			
		4-Hr.	3-Hr.	2-Hr.	1-Hr.	4-Hr.	3-Hr.	2-Hr.	1-Hr.
	(a) Solid—(Clay, shale, concrete or sand-lime) —unplastered.	12	12	8	8	8	8	8	....
	Solid—(as above) ½" (1:3) sanded gypsum plaster on one side.	12 (1)	8 or 12 (1) (2)	8 (1)	8 (1)	8	8	8	....
	Solid—(as above) ½" (1:3) sanded gypsum plaster on each side.	12	8 or 12 (2)	8	8	8	8	....	....
BRICK WALLS	(b) Hollow Cavity Type (clay or shale) Unplastered or ½" (1:3) sanded gypsum on each side— ¼" metal ties for each 3 sq. ft. of wall area.	....	....	9 (3)	9	9	9	9	9

Table 1003(a) (Continued)

		4-Hr.	3-Hr.	2-Hr.	1-Hr.	4-Hr.	3-Hr.	2-Hr.	1-Hr.
BRICK WALLS	(c)—Hollow Rolok (clay or shale) Unplastered	....	12	12	8	12	....	8	....
	½" (1:3) sanded gypsum plaster on one side	12	....	....	8	....	8	....	....
	½" (1:3) sanded gypsum plaster on each side	....	....	....	....	8	....	....	....
	(d)—Hollow Rolok Bak (clay or shale) Unplastered	....	....	....	....	8	....	....	....
	Plain Concrete Solid Walls (Unplastered) (4)	8	....	....	....	8	....	....	....
	Solid Concrete Reinforced with (4) 4 x 4 inch wire welded fabric near the center plane of wall	....	....	6	....	....	6	....	....
	Hollow Structural Tile (Clay or Shale) Walls Unplastered	16-12 (5)(6)	12 or 16 (6)(7)	12 (6)(8)	8 or 12 (6)(9)	12 (10)	8 or 12 (11)	8 or 12 (14)	8 (13)
	⅝" (1:3) sanded gypsum plaster on one side.	16 (6)(7)	12 (6)(8)	8 or 12 (6)(12)	8 (6)(13)	8 or 12 (11)	8 or 12 (14)	8 (15)	....
Structural Tile-Brick Faced Walls	Hollow Structural Tile (Clay or Shale)—Brick Faced Walls (Tile bonded to 4" Brick Facing Unplastered, total Masonry thickness	....	....	12	8	12	8	....	....
	⅝" (1:3) sanded gypsum plaster on tile side, total masonry thickness		16	12	8	8		....	....

Table 1003(a) (Continued)

		4-Hr.	3-Hr.	2-Hr.	1-Hr.	4-Hr.	3-Hr.	2-Hr.	1-Hr.
		Combustible				Non-Combustible			
Hollow Concrete Masonry Units	Volcanic Pumice, Expanded Slag, Aircooled Slag, or Burned Clay or Shale Aggregates Unplastered	Note 1: If hollow spaces (cells) surrounding the ends of combustible members are filled solidly with masonry the rating will be the same as for incombustible or no members framed into the wall, except that the rating cannot exceed the rating for solid walls of the same thickness with combustible framing.				6-2 8-1-½ (16)	8-1-½	6-1-⅜ 8-1-¼	
	Plastered on one side	Note 2: Applicable to hollow concrete masonry units, in each pair of numbers listed in the table, the first number is the minimum thickness of wall and the second number is the minimum thickness of the face shell expressed in inches in each case.				....	6-1-3.8 8-1-¼	4-1- 5/16 5-1-⅛	3-1
	Plastered on each side					....	4-1-5/16	3-1	....
	Other Aggregates Unplastered					8-2-¼ 12-1-¾	6-1-⅛		
							6-2 8-1-¾	8-1-⅜	4-1
	Plastered on one side					....	....	4-1- 5/16	3-1
	Plastered on each side					6-2 8-1-¾	8-1-⅜	4-1	....

TABLE 1003(b) — LOAD BEARING WALLS AND PARTITIONS

WALL OR PARTITION ASSEMBLY	FIRE-RESISTANCE RATING	
	Plaster Side Exposed	Brick-Faced Side Exposed
STEEL-FRAMED BRICK-VENEERED WALLS Steel studs faced outer side with ½" wood fibreboard sheathing next to studs, ¾" air space formed with ¾" x 1⅝" wood strips placed over the fibreboard and secured to the studs; metal or wire lath nailed to such strips, 3¾" brick veneer held in place by filling ¾" space between the brick and lath with mortar. Inside facing of studs: ¾" unsanded gypsum plaster on metal (or wire) lath attached to 5/16" wood strips secured to the edges of the studs.	1-½-hr.	4-hr.
Steel studs faced outer side with 1" insulation board sheathing attached to studs, 1" air space, and 3¾" brick veneer attached to steel frame with metal ties every fifth course. Inside facing of studs: ⅞" sanded gypsum plaster (1:2 mix) applied on metal (or wire) lath attached directly to the studs.	1-½-hr.	4-hr.
Same as the above except use ⅞" vermiculite-gypsum plaster or 1" sanded gypsum plaster (1:2 mix) applied on metal or wire lath.	2-hr.	4-hr.
Steel studs faced outer side with ½" gypsum sheathing board, attached to studs, and 3¾" brick veneer attached to the steel frame with metal ties every fifth course. Inside facing of studs: ½" sanded gypsum plaster (1:2 mix) applied on ½" perforated gypsum lath (see Sec. 1001.5) securely attached to the studs and having strips of metal lath 3 inches wide applied to all horizontal joints of gypsum lath.	2-hr.	4-hr.

Table 1003 (b) (Continued)

Wall or Partition Assembly			Fire-Resistance Ratings
WOOD-FRAMED WALLS AND PARTITIONS			
	Metal or wire lath (except as noted) and plaster on both sides of 2" x 4" (or larger) wood stud framing, effectively fire-stopped.	(a)—⅝" sanded gypsum plaster (mix 1:2) or ¾" sanded gypsum plaster (mix 1:2, 1:3) on metal lath or paper - backed wire fabric.	1-hr.
		(b)—⅝" vermiculite-gypsum or perlite-gypsum plaster on metal lath.	1-hr.
		(c)—¾" sanded portland cement plaster (mix 1:2, 1:3 with 3 lbs. of short asbestos fiber per bag of cement) on metal or wire lath.	1-hr.
Wood Framed Plaster and Wallboard Partitions	Gypsum lath and plaster on both sides of 2" x 4" (or larger) wood stud framing, effectively fire-stopped.	(a)—½" sanded gypsum plaster (mix 1:2) applied to ⅜" perforated gypsum lath.	1-hr.
		(b)—½" vermiculite-gypsum or perlite-gypsum plaster applied to ⅜" perforated gypsum lath.	1-hr.
	Gypsum wallboard on both sides of 2" x 4" (or larger) wood stud framing, effectively fire-stopped.	(a)—Two layers of ⅜" or ½" gypsum wallboard attached to both sides of wood studs.	1-hr.

Table 1003 (b) (Continued)

Wall or Partition Assembly			Fire-Resistance Ratings
		(b)—One layer of ½" gypsum wallboard attached to both sides of wood studs, with stud spaces filled with mineral wool insulation bats nailed in place to the studs.	1-hr.
	Approved gypsum wallboard or coreboard with a specially formulated core which provides greater fire-resistance than regular wallboard or coreboard of the same thickness, on both sides of 2" x 4" (or larger) wood stud framing, effectively fire-stopped.	(a)—One layer ⅝" gypsum wallboard attached to both sides of wood studs.	1-hr.
		(b)—Two layers ⅝" gypsum wallboard attached to both sides of wood studs.	2-hr.
Wood Framed Exterior Walls	Wood studs 2" x 4" (or larger) effectively fire-stopped; outer face gypsum sheathing board and wood siding; inner face gypsum plaster on gypsum lath.	Wood siding on ½" gypsum sheathing board attached to outer face of wood studs; ½" sanded gypsum plaster (mix 1:2) on ⅜" perforated gypsum lath on inner face of studs; ratings for outside fire exposure.	1-hr.
Steel Stud Hollow Partitions	Steel studs to both faces of which is attached plaster applied to metal or wire lath, with not less than 2" airspace between inside faces of lath.	Each face—1" unsanded gypsum plaster.	2-hr.
		¾" unsanded gypsum plaster.	1½-hr.

Table 1003(b) (Continued)

Wall or Partition Assembly			Fire-Resistance Rating
		¾" sanded gypsum plaster (mix 1:2, 1:3).	1-hr.
	Steel studs to both faces of which is attached plaster applied to ⅜" perforated gypsum lath with not less than 2" airspace between inside faces of lath.	Each face—⅝" unsanded gypsum plaster.	1-hr.

CHAPTER X — FIRE-RESISTANCE RATINGS

REFERENCE NOTES TO TABLE 1003 (a)—FIRE-RESISTANCE RATINGS FOR WALLS AND PARTITIONS

(1)—Rating is applicable only when the plastered side of wall or partition is on the exposed side.

(2)—8" for sand-lime or concrete brick or 12" for clay or shale brick (3-hr. rating).

(3)—A 9" wall may be used for a 2-hr. rating if hollow spaces near combustible members are filled with fire-resistive material for the full thickness of the wall and for at least 4" above and below and between the combustible members.

(4)—Grade A and Grade B concrete shall comply with the requirements in Section 1001.1.

(5)—Two or three units, four or five cells in wall thickness. Units not less than 40% solid.

(6)—The ratings for tile walls with combustible members projecting into the walls may be increased to those given for similar walls with non-combustible members if the spaces surrounding the ends of the members are filled solidly with mortar or masonry.

(7)—16" tile (two units, four cells in wall thickness); or 12" hollow tile (one unit, three cells in wall thickness, units not less than 49% solid).

(8)—One unit, three cells in wall thickness. Unit not less than 40% solid.

(9)—12" hollow tile three cells in wall thickness (8" tile if hollow spaces are filled as required in Reference Note (3) herein); or 8" hollow tile (one unit, two cells in wall thickness, units not less than 46% solid).

(10)—Two units, three or four cells in wall thickness. Units not less than 45% solid.

(11)—12" hollow tile (two units, three cells in wall thickness); or 8" hollow tile (one unit, three or four cells in wall thickness, units not less than 53% solid).

(12)—12" hollow tile, two cells in wall thickness (8" tile if hollow spaces are filled as required in Reference Note (3) herein); or 8" hollow tile (one unit, two cells in wall thickness, units not less than 49% solid).

(13)—One unit, two cells in wall thickness. Units not less than 40% solid.

(14)—12" hollow tile (three cells in wall thickness); or 8" hollow tile (one unit, two cells in wall thickness, units not less than 49% solid).

(15)—8" hollow tile (three cells in wall thickness); or 8" hollow tile (one unit, two cells in wall thickness, units not less than 40% solid).

(16)—8" hollow concrete masonry units with 1½" thickness of face shell must be plastered on one side for burned clay or shale aggregate, for the 4-hr. rating.

GENERAL REQUIREMENTS—FIRE-RESISTANCE RATINGS FOR WALLS AND PARTITIONS—TABLE 1003 (a)

PLASTER

Plaster, when applied to masonry or gypsum lath, shall be no less than ½-inch in thickness. Thickness shall be measured from the face of the plaster base except that for metal or wire lath the thickness of plaster shall be measured from the back of the lath, except as otherwise prescribed.

Gypsum plaster as required for the fire-resistance ratings indicated in Chapter X may be fibered or unfibered.

THICKNESS OF WALLS

The thickness prescribed in Table 1003 (a) for masonry and tile walls and partitions of the various fire-resistance ratings do not include the thickness of plaster.

MORTAR

For the fire-resistance ratings indicated in Table 1003 (a), masonry walls shall be laid in portland cement-lime mortar, or portland cement mortar, provided that gypsum blocks shall be laid in gypsum mortar only. Hollow structural clay tile partitions also may be laid in gypsum mortar. Mix of portland cement-lime mortar shall be not leaner than 1:1:6 (by volume) for all brick walls and for all concrete masonry units, except that solid brick walls 8" and over in thickness may be laid in 1:3 (by volume) portland cement or lime mortar. Mix of Portland cement-lime mortar for structural clay tile walls and partitions shall be not leaner than 1:1:6 mix (by volume). Mix of gypsum mortar shall be not leaner than 1:3 (by weight).

CLOSURE OF ENDS

All open cells in tile or block occuring at wall ends shall be filled solid with concrete or gypsum for at least a depth of 6 inches, or solid units or closure tile set in the opposite direction shall be used. No fire-wall of hollow units and no 8 inch solid wall shall be broken into, subsequent to erection, for chases or for the insertion of structural members.

MAXIMUM ALLOWABLE HEIGHTS OF PARTITIONS

All masonry, tile, or block load-bearing partitions required to have a specific fire-resistance rating by the provisions of this code shall be limited in height not to exceed thirty times their thickness, except when securely anchored at top and bottom, and except where fire-resistance ratings for such partitions of greater height than herein specified have been established by actual fire tests conforming with the requirements of Section 1001. For height of non-bearing partitions of masonry and those of plaster on metal or wire lath, see Section 1405.3. Two-inch solid, studless partitions of gypsum plaster on metal lath or gypsum lath shall not exceed 12 ft. in height.

FIRESTOPPING

Hollow partitions shall be firestopped with non-combustible materials at every floor.

LATH

Metal or wire lath used in fire-resistant walls or partitions shall meet the requirements of Section 1001.7. Gypsum lath, gypsum wallboard, and gypsum sheathing board used in fire-resistant walls or partitions shall meet the requirements of Section 1001.6.

COMBUSTIBLE MEMBERS FRAMED INTO WALLS

For plaster on the same side as combustible framing, and for plaster on one side of walls or partitions which support combustible

members from both sides, the fire-resistance rating for such walls or partitions shall be the same as the rating for the same walls unplastered.

SECTION 1004 — FIRE RESISTANCE RATINGS FOR PROTECTED STEEL COLUMNS

The fire-resistance of protected steel columns shall be rated in accordance with this section and Table 1004 for the types of protection indicated, except as otherwise provided in Section 1001. See also the General Requirements which follow Table 1004.

TABLE 1004—FIRE-RESISTANCE RATINGS FOR PROTECTED STEEL COLUMNS

PROTECTIVE MATERIAL	Minimum Nominal Thickness Outside of Column (in inches) for Rating Indicated. 4-hr.	3-hr.	2-hr.	1-hr.
Concrete (Re-entrant, space filled solid.)				
(a)—Grade A Concrete (r) (course aggregate other than trap rock) and except that it shall have a combined total of not more than 10% of quartz, chert, or flint.				
6" x 6" columns	2	1-½	1	1
8" x 8" columns	1-½	1	1	1
12" x 12" columns or larger	1	1	1	1
(b)—Trap rock course aggregate, or Grade A Concrete (r) with coarse aggregate having a combined total of from 10% to 30% of quartz, chert, or flint with wire ties as prescribed in Reference Note (c); or cinder, sandstone or granite aggregate of Grade B. Concrete (r) if concrete is held in place as prescribed in Reference Note (d).				
6" x 6" columns	2-½	2	1-½	1
8" x 8" columns	2	1-½	1	1
12" x 12" columns or larger	1-½	1	1	1
(c)—Cinder, sandstone, or granite aggregate of Grade B Concrete (r) with wire ties as prescribed in Reference Note (c); or siliceous aggregate of Grade B Concrete (r) having a combined total or 60% or more of quartz, chert, or flint if concrete is held in place as prescribed in Reference Note (d).				
6" x 6" columns	3	2	2	1
8" x 8" columns	3	2	1-½	1
12" x 12" columns or larger	2	1-½	1	1

TABLE 1004 (Continued)

PROTECTIVE MATERIAL	4-hr.	3-hr.	2-hr.	1-hr.
(d)—Siliceous aggregate of Grade B Concrete (r) having a combined total of 60% or more of quartz, chert, or flint with wire ties as prescribed in Reference Note (c).				
6" x 6" columns	4-½	3½	2-½	1-½
8" x 8" columns	4	3	2	1
12" x 12" columns or larger	3	2	1-½	1
Hollow Clay or Shale Tile (e) Unplastered	f	2 (g)	—	2 (h)
Plastered with ¾" sanded gypsum plaster (1:3 mix by volume).	2 (i)	—	—	—
Gypsum (e) — Poured solid (re-entrant space filled) and reinforced with 4" by 4" wire mesh reinforcement wrapped around column Unplastered	2	1-½	1	1
Gypsum (Solid) Block (e) Unplastered	4 (j)	—	2 (k)	—
Plastered with ½" sanded gypsum plaster	2 (m)	—	—	—
Gypsum (Hollow) Block (e) Unplastered	—	—	3 (n)	—
Plastered with ½" sanded gypsum plaster	3 (o)	—	—	—
Cinder Concrete (Hollow) Block (e) Unplastered	3 (p)	—	—	—
Solid Brick (Clay or Shale) (e) Re-entrant space filled with brick and mortar	3-¾	3-¾	3-¾	2-¼
Metal or wire Lath and Plaster Sanded gypsum plaster (mix 1:3)	—	—	2-¼ (q)	¾
Sanded portland cement plaster (mix 1:2-½)	—	—	2-¾ (q)	1
Vermiculite-gypsum or perlite-gypsum plaster on metal lath.	(a)	(b)	(s)	—
Gypsum Lath and Plaster Sanded gypsum plaster	—		(x)	(t)
Vermiculite-gypsum or perlite-gypsum plaster	(u)	(v)	(w)	—

Reference Notes to Table 1004 — Fire Resistance Ratings for Protected Steel Columns

(a)—1-¾ inch vermiculite or perlite-gypsum plaster on self furring metal lath wrapped around column — no back-fill; 1-½ inch vermiculite-gypsum or perlite-gypsum plaster on metal lath — lath furred out 1-¼ inches from column flanges, with space between lath and column flanges filled with the same plaster— no back-fill; or 1 inch vermiculite-gypsum plaster on metal lath—lath spaced 1 inch from flanges of column—loose vermiculite back-fill; or 1-½" perlite-gypsum plaster on metal lath furred 7/16" from column with ¾" channels; no back-fill.

(b)—1 inch vermiculite-gypsum or perlite-gypsum plaster on metal lath — lath furred out 1-¼ inches from column flanges with space between column flanges and lath filled with vermiculite-gypsum or perlite-gypsum plaster—no back-fill; or 1⅜ inch perlite-gypsum plaster on self-furring metal lath wrapped around column — no back-fill.

(c)—Concrete shall be held in place with wire ties consisting of No. 5 B & S gage (0.18 inch diam.) steel wire spirally around the column on a pitch of 8 in., or equivalent ties.

(d)—Concrete shall be held in place with wire mesh or expanded metal having not larger than 4" mesh, weighing not less than 1.7 lbs. per sq. yd., or equivalent.

(e)—The ratings indicated are applicable to steel columns 6" x 6" or larger.

(f)—Structural steel columns protected with 2" hollow clay or shale tile, having wire mesh in horizontal joints, flanges covered with mortar or concrete, re-entrant space filled with concrete, shall have a fire-resistance rating of 4-hours if minimum area of solid material is not less than 225 sq. in. For columns of less size two 2" layers of hollow clay or shale tile, ½" mortar between tile and column, ⅜" metal mesh in horizontal joints, hollow clay tile fill, shall be required for 4-hour rating.

(g)—Hollow clay tile with outside wire ties (not less than No. 12 B & S gage—0.08" diameter steel wire tied around the outside of each course of tile at the middle) or with ⅜" metal mesh in horizontal joints; limestone or trap rock concrete fill extending 1" outside column on all sides.

(h)—Hollow clay tile with outside wire ties (not less than those prescribed in Reference Note (g) herein), with or without concrete fill ¾" mortar between column and tile.

(i)—¾" mortar between column and tile; ⅜" metal mesh in horizontal joints, limestone concrete fill.

(j)—⅜" metal mesh (or equivalent) ties in horizontal joints; 1" gypsum mortar on flange; poured gypsum fill, or re-entrant space filled with gypsum block and mortar.

(k)—Same as prescribed in Reference Note (j) herein—or ⅞" x 12 gage (or equivalent) metal clamps, at horizontal joints, set in holes drilled in blocks; 1" gypsum mortar on flange at horizontal joints only; re-entrant space not filled.

(l)—Metal or wire lath, or mesh (or equivalent ties) in horizontal joints; ½" mortar between column and block; poured gypsum fill, or re-entrant space filled with gypsum block and mortar or ⅞" x 12 gage (or equivalent) metal clamps, at horizontal joints set in holes drilled in blocks; re-entrant space not filled.

(m)—⅞" x 12 gage (or equivalent) metal clamps, at horizontal joints, set in holes drilled in blocks; re-entrant space not filled.

(n)—Same as prescribed in Reference Note (m) herein except ¼" mortar is required between column flange and block.

(o)—1¼" mortar between column and block; re-entrant space filled with broken block and mortar.

(p)—Total thickness, consisting of two layers of plaster, with ¾" air space between, provides a fire-resistance rating of 2½ hours; no fill.

(q)—For definition of Grade A Concrete and Grade B Concrete see Section 1001.2.

(r)—1 inch vermiculite-perlite-gypsum plaster on metal lath — lath furred out 1¼ inch from column flanges—no back-fill; or 1 inch vermiculite-perlite-gypsum plaster on self-furring metal lath wrapped around column—no back-fill.

(s)—⅜ inch perforated gypsum lath applied vertically with double strands 18 gage tie wire spaced 2 inches from ends of lath and 15 inches center to center at intermediate points — plastered with ½ inch sanded gypsum plaster (mix 1:2½).

(t)—Two layers ½ inch long-length gypsum lath tied with double strand 18 gage tie wire spaced approximately 24 inches center to center and wrapped with 1 inch hexagonal mesh, 20 gage galvanized fabric — two ¾ inch coats perlite-gypsum or vermiculite plaster — no back-fill.

(u)—⅜" perforated gypsum lath applied vertically and tied with double strands of 18 gage tie wires spaced 2" from ends of lath and 15" center to center at intermediate points. Plastered with 1⅜" gypsum perlite or gypsum vermiculite plaster (mix 1:2, 1:3). (NBS Test No. 321).

(v)—⅜ inch perforated gypsum lath applied vertically and tied with double strands 18 gage tie wire spaced 2 inches from ends of lath and 15 inches center to center at intermediate points—plastered with 1 inch vermiculite-perlite-gypsum plaster (mix 1:2½).

(w)—⅜" perforated gypsum lath applied vertically and tied with double strands of 18 gage tie wires spaced 2" from ends of lath and 15" center to center at intermediate points. Plastered with 1⅜" gypsum sand plaster (mix 1:2, 1:3). (NBS Test No. 351 and letter from Dr. A. F. Robertson, Chief, Fire Protection Section, National Bureau of Standards, October 7, 1957).

(x)—⅜" perforated gypsum lath applied vertically and tied with double strands of 18 gage tie wires spaced 2" from ends of lath and 15" center to center at intermediate points. Plastered with 2" gypsum sand plaster (mix 1:2, 1:3). (NBS Test No. 344).

FIRE-RESISTANCE RATINGS FOR STEEL COLUMNS PARTLY PROTECTED WITH CONCRETE

Steel columns of solid section (not latticed) unprotected outside, but having re-entrant space filled with Grade A Concrete (see Sec. 1001.2) and having minimum area of solid materials not less than 64 sq. inches, shall have their fire-resistance rated at 1 hour.

GENERAL REQUIREMENTS — FIRE-RESISTANCE RATINGS FOR PROTECTED STEEL COLUMNS — TABLE 1004

THICKNESS

The thicknesses in Table 1004 refer to thicknesses of protective material before the application of plaster except that the thickness indicated for plaster protection is total plaster thickness. Thicknesses shall be measured from the extreme outer edge of the member, except that the thickness of protective material required at the extreme edges of lugs, brackets, wind bracing and other connections shall be not less than 1 inch.

REINFORCEMENT

Except as otherwise prescribed in Table 1004, poured protection shall be adequately reinforced with not less than 4" x 4" wire mesh weighing not less than 1½ lbs. per square yard, or equivalent reinforcement.

MORTAR JOINTS

Protective coverings that consist of masonry units shall be solidly bedded and laid in portland cement or portland cement-lime mortar, except that gypsum blocks shall be laid in gypsum mortar; structural clay tile units may likewise be laid in gypsum mortar.

BONDS AND TIES

Except as otherwise prescribed in Table 1004, block and tile protective coverings shall be securely anchored or bonded by wall ties or metal mesh laid in the horizontal joints, by metal clips connecting one unit to another, by outside tie wires not smaller than No. 12 B and S gage (0.08" diameter) with at least one such tie around every course, or by means of specially designed units providing positive anchorage to the member or to other units. Outside tie wires shall in all cases be protected by at least ½ inch of mortar or plaster.

METAL OR WIRE LATH

Where metal lath is prescribed in Table 1004, it shall meet the minimum requirements of Section 1001.7 of this Code.

GYPSUM LATH

Where gypsum lath is prescribed in Table 1004, it shall meet the minimum requirements of Section 1001.6 of this Code. Applicable to ratings prescribed in Table 1004 for steel columns protected with gypsum lath and plaster, the column protection shall be provided with corner beads with expanded metal wings wired with No. 18 gage tie wires surrounding the column at intervals not to exceed 15 inches.

SECTION 1005 — FIRE RESISTANCE RATINGS FOR PROTECTED STEEL BEAMS, GIRDERS AND TRUSSES

The fire-resistance of protected steel beams, girders, and trusses shall be rated as indicated for the various protective materials in this section and in Table 1005, except as provided in Section 1001. See also the general requirements following Table 1005.

TABLE 1005—FIRE-RESISTANCE RATINGS FOR PROTECTED STEEL BEAMS, GIRDERS AND TRUSSES

	Minimum Nominal Thickness Outside of Members (in inches) for Rating Indicated.					
Protective Material	4-hr.	3-hr.	2½-hr.	2-hr.	1½-hr.	1-hr.
Concrete (Re-entrant space filled solid)						
Grade A Concrete (a)	2	2	1-½	1-½	1-½	1
Grade B Concrete (b)	2-½	2-½	2	2	2	1-½
Hollow Clay or Shale Tile or Concrete						
Block Unplastered	—	—	—	2 (c)	2 (c)	2
Plastered with ½" sanded portland cement or gypsum plaster	3 (c)	2 (c)	2 (c)	2	—	—
Gypsum - Poured solid (re-entrant space filled) Unplastered	2	1-½	1-½	1-½	1	1
Plastered with ½" sanded gypsum plastered	1-½	1	1	1	½	½
Gypsum (Solid) Block Unplastered - Joints grouted	—	—	2	2	2	2
Plastered with ½" sanded gypsum plaster	2	2	2	2	2	2
Gypsum (Hollow) Block Unplastered - Joints grouted	—	3	3	3	3	3
gypsum plaster	3	3	3	3	3	3
Brick - Hollow or Solid (Clay, Concrete or Sand-lime) - Unplastered	3-¾	3-¾	3-¾	2-¼	2-¼	2-¼
Metal or Wire Lath and Plaster Sanded Portland cement plaster	—	—	—	—	(l)	(m)
Sanded gypsum plaster	—	—	(d)	(g)	(j)	(k)
Unsanded gypsum plaster	—	(h)	(i)	—	—	—
Vermiculite - gypsum or perlite gypsum plaster	(e)	(f)	(f)	—	—	—

Reference Note to Table 1005—Ratings for Protected Steel Beams, Girders, and Trusses

(a)—Grade A Concrete shall comply with the requirements in Section 1001.1—Metal ties bent around beam flanges and other projecting parts.

(b)—Grade B Concrete shall comply with the requirements in Section 1001.1—3 inch or smaller metal mesh placed 1 inch from surface.

(c)—All spaces between structural member and tile or block shall be filled solid.

(d)—⅞ inch sanded gypsum plaster (mix 1:2) on metal or wire lath directly attached, furred or suspended—structural member protected on top with concrete or gypsum slab not less than 2½" thick or equivalent.

(e)—1 inch vermiculite-gypsum plaster on metal lath directly attached, furred or suspended—or ⅝ inch vermiculite-gypsum plaster plus ½ inch vermiculite acoustical plastic on metal lath.

(f)—¾ inch vermiculite-gypsum plaster on metal or wire lath directly attached, furred, or suspended with non-combustible construction above.

(g)—¾ inch sanded gypsum plaster (mix 1:2, 1:3) on metal lath attached, furred, or suspended—structural member protected on top with a concrete or gypsum slab not less than 2¼ inches thick or equivalent.

(h)—1 inch unsanded gypsum plaster on metal or wire lath directly attached, furred, or suspended.

(i)—1 inch unsanded gypsum plaster on metal or wire lath attached, furred, or suspended—structural member protected on top with a concrete or gypsum slab not less than two inches thick or equivalent.

(j)—¾ inch sanded gypsum plaster (mix 1:2, 1:3) on metal or wire lath directly attached, furred, or suspended—structural member protected on top with a concrete or gypsum slab not less than 2 inches thick or equivalent; or structural member protected with 1 inch thickness of metal or wire lath and sanded gypsum plaster (mix 1:3).

(k)—Structural member protected with ¾ inch metal or wire lath and sanded gypsum plaster (mix 1:3).

(l)—Structural member protected with 1 inch metal or wire lath and sanded portland cement plaster (mix 1:2½); or ¾ inch sanded portland cement plaster (mix 1:2, 1:3—with 15 lbs. hydrated lime and 3 lbs. short asbestos fiber per bag of portland cement) on metal or wire lath directly attached, furred, or suspended—structural member protected on top with a concrete or gypsum slab of not less than 2 inches thick or equivalent.

(m)—Structural member protected with 1 inch metal or wire lath and sanded portland cement plaster (mix 1:2½).

GENERAL REQUIREMENTS—FIRE-RESISTANCE RATINGS FOR PROTECTED STEEL BEAMS, GIRDERS AND TRUSSES—TABLE 1005

For the foregoing ratings in Table 1005, fire-resistive materials shall protect flanges and portions of webs and members not otherwise protected by arches, slabs, or ceilings.

For ratings of Steel Floor and Roof assemblies, see Section 1007.

THICKNESS

For block and poured protections, thicknesses in Table 1005 refer to thickness of protective material before the application of plaster. Such thickness shall be measured from the extreme outer edge of the member, except that the thickness of protective material required at the extreme edges of lugs, brackets, wind bracing and other connections shall be not less than 1 inch.

REINFORCEMENT

Except as otherwise prescribed, poured protections listed in Table 1005 shall be adequately reinforced with 4" x 4" wire mesh weighing not less than 1½ lbs. per square yard, or equivalent reinforcement.

MORTAR

Protective coverings of masonry units shall be solidly bedded and laid in portland cement or portland cement-lime mortar, except that gypsum blocks shall be laid in gypsum mortar and structural clay tile units may likewise be laid in gypsum mortar.

BONDS OR TIES

Block and tile protective coverings shall be securely anchored or bonded by wall ties or metal mesh laid in the horizontal joints, by metal clips connecting one unit to another by outside tie wires not smaller than No. 12 B and S gage (0.08" diameter) with at least one such tie around every course, or by means of specially designed units providing positive anchorage to the member or to other units. Outside tie wires shall in all cases be protected by at least ½" of mortar or plaster.

PLASTER THICKNESS

Except as otherwise prescribed in Table 1005, wherever plaster is required to be applied to masonry, gypsum or portland cement plaster not less than ½" thick shall be used except that on gypsum units, gypsum plaster only shall be used. Thickness of plaster applied to

metal or wire lath shall be measured from the back of the lath, except as otherwise noted.

METAL OR WIRE LATH

Metal lath or wire lath shall meet the requirements of Section 1001.7 of this Code.

SECTION 1006 — FIRE RESISTANCE RATINGS FOR REINFORCED CONCRETE COLUMNS, BEAMS, GIRDERS AND TRUSSES

For the fire-resistance ratings of reinforced concrete columns, beams, girders, and trusses indicated, the various thicknesses of fire protection outside of reinforcing steel shall be not less than that prescribed in Table 1006, except as provided in Section 1001. Coarse aggregates shall not exceed ¾ inch in diameter for concrete used to meet fire-protection requirements.

Gypsum or portland cement plaster, not less than ¾ inch in thickness, applied on metal lath or wire lath and in contact with the concrete, may be substituted for ½ inch of the required poured protection, provided that such poured protection shall in no case be reduced to less than 1 inch in thickness. Metal or wire lath used for such purposes shall conform to the provisions of Section 1001.7.

TABLE 1006—FIRE-RESISTANCE RATINGS FOR REINFORCED CONCRETE COLUMNS, BEAMS, GIRDERS, AND TRUSSES

QUALITY OF CONCRETE	Minimum Thickness Outside of Reinforced Steel (in Inches) for Rating Indicated.			
	4-hr.	3-hr.	2-hr.	1-hr.
Reinforced Concrete Columns (a)				
Concrete - Coarse aggregate limestone, calcareous gravel (b), trap rock or blast furnace slag - 12" or larger round or square columns - Unplastered	1-½	—	—	—
Concrete - Coarse aggregate granite, sandstone, or siliceous gravel (c) - 16" or larger round or square columns - Unplastered	2-½	1-½	—	—
Plastered (e)	1-½	—	—	—
Concrete - Coarse aggregate granite, sandstone, or siliceous gravel (c), Light 2" mesh expanded metal (or equivalent) centrally located in the protective covering. 12" to 14" round or square columns - Unplastered	—	1-½	—	—
14" or larger round or square columns - Unplastered	1-½	—	—	—
Reinforced Concrete Beams, Girders, and Trusses Concrete coarse aggregate - Grade A Concrete (d) Unplastered	1-½	1-½	1-½	1
Concrete Coarse aggregate - Grade B Concrete (d) Unplastered	2-½	2-½	2	1-½
Concrete coarse aggregate - Grade B Concrete (d) Unplastered - 3" or smaller metal mesh centrally located in the protective covering.	2	1-½	1-½	1

Reference Notes to Table 1006—Fire-Resistance Ratings for Reinforced Concrete Columns, Beams, and Trusses

(a)—These ratings apply to columns with standard ties or spirals, and to columns without spirals, if designed on the basis that the protective concrete covering carries no load.

(b)—Gravel containing not more than 10% quartz, chert, or flint.

(c)—Gravel containing 60% or more quartz, chert, or granite.

(d)—Grade A Concrete and Grade B Concrete shall comply with the requirements in Section 1001.2.

(e)—½" coarse aggregate; column covered with 1 inch of 1:2½ (by volume) portland cement and sand or gypsum and sand plaster, with admixture of not over ½ part lime; surface of column hacked or column cast in metal lath serving as a form.

SECTION 1007 — FIRE RESISTANCE RATINGS FOR FLOOR AND ROOF CONSTRUCTIONS

The fire-resistance of floor and roof constructions described in this Section shall be rated in accordance with this Section and Table 1007 except as provided in Section 1001.

Where plaster ceiling is required in Table 1007 and no thickness is specified, plaster shall be not less than ½ inch thick. On gypsum units, gypsum plaster only shall be used. Thickness of plaster shall be measured from the face of the plaster base.

Wood finish floors may be used with the constructions rated in this Section, unless prohibited elsewhere in this Code.

TABLE 1007 — FIRE-RESISTANCE RATINGS FOR FLOOR AND ROOF CONSTRUCTIONS (h)

Construction		Fire-Resistance Rating
Reinforced Concrete (g)	4½" slab, expanded slag aggregate, ¾" protection of reinforcement.	4-hr.
	6" slab, air-cooled slag aggregate, 1" protection of reinforcement.	4-hr.
	3" slab, Grade A concrete; Ceiling, 1" vermiculite-gypsum or perlite-gypsum plaster over face of metal lath supported from bottom of slab. (f)(g).	4-hr.
	6" slab, Grade A or Grade B concrete (Section 1001.2), 1" protection of reinforcement.	3-hr.

Construction		Fire-Resistance Rating
	6" slab, Grade A or B concrete (Sec. 1001.2) with electrical raceways and junction boxes, 1" protection of reinforcement if marker screws are used.	3-hr. 2-hr.
	2" slab, Grade A concrete; Ceiling, ¾" vermiculite-gypsum or perlite-gypsum plaster over face of metal lath supported from bottom of slab. (f) (g).	3-hr.
	4¾" slab, air-cooled slag aggregate, ¾" protection of reinforcement.	2½-hr.
	4¾" slab, Grade A or Grade B concrete (Section 1001.2, ¾" protection of reinforcement.	2-hr.
	4" slab, Grade A or Grade B concrete (Section 1001.2) ¾" protection of reinforcement.	1-hr.
Monolithic Concrete Slab Joist and Beam Construction	Monolithic reinforced slab, joist and beam with electrical raceways and junction boxes with joists not less than 5" wide ¾" minimum protection for reinforcement and having plastered ceiling over face of metal lath.	
	3" top slab; ceiling 1" vermiculite-gypsum plaster (mix 1:2, 1:3)	4-hr.
	5" slab at underfloor ducts and junction boxes.	
	2" top slab; ceiling ¾" vermiculite-gypsum plaster (mix 1:2, 1:3).	3-hr.
	4" slab at underfloor ducts and junction boxes.	
	Monolithic reinforced slab, joist and beam, joists not less than 5" wide with ¾" minimum protection for reinforcement and top slab not less than 3" thick.	1-hr.

TABLE 1007 (Continued

Construction		Fire-Resistance Rating
Concrete Joist Construction (g)	Reinforced concrete top slab on concrete joists not less than 4" wide and not over 30" on centers with ¾" minimum protection for reinforcement, and having plastered ceiling over face of metal lath.	
	2½" top slab; ceiling ⅞" unsanded gypsum plaster or ⅝" vermiculite-gypsum or perlite-gypsum plaster.	3-hr.
	2¼" top slab; ceiling ⅝" sanded gypsum plaster (mix 1:2, 1:3).	2-hr.
	2" top slab; ceiling ⅝" sanded gypsum plaster (mix 1:2, 1:3) or ⅝" sanded portland cement plaster (mix 1:3 with 15 lbs. of hydrated lime and 3 lbs. of short asbestos fiber per bag of cement).	1½-hr.
Concrete and Concrete Block	Concrete block and concrete composite construction consisting of concrete block fillers not less than 3⅝" deep with reinforced concrete ribs (¾" protection for reinforcement) and concrete top slab not less than 2½" thick.	3½-hr.
Concrete and Tile	Tile and concrete composite construction consisting of tile fillers of concrete, gypsum, or structural clay tile not less than 4" deep, with reinforced concrete ribs (¾" protection for reinforcement) and concrete top slab not less than 2" thick.	2½-hr.
	Tile and concrete, composite construction as prescribed above except omitting the top slab and having a gypsum plastered ceiling.	1½-hr.
Gypsum	Poured reinforced gypsum slab at least 3" thick having ¾" minimum protection for reinforcement and with a ceiling of gypsum plaster.	2½-hr.
	2½" Class A (500 PSI) gypsum concrete on ½" gypsum formboard, concrete reinforced with 48-1214 welded wire fabric (self-furring to keep fabric ½" above formboard) sub-purlins (bulb tees) exposed.	2-hr.
	2" Class A (500 PSI) gypsum concrete on ½" gypsum formboard. Concrete reinforced with 48-1214 welded wire fabric, sub-purlins (bulb tees) exposed.	1-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
Brick	Brick arch not less than 4" deep with a level concrete fill 2" above crown.	2½-hr.
Clay Tile	Flat arch of clay tile, 2-cell structural tile not less than 8" deep, with floor fill of incombustible material at least 2" thick and having gypsum plaster ceiling.	2½-hr.
	Segmental arch of clay tile, 2-cell structural tile not less than 6" deep, laid in cement mortar with concrete fill level with crown of arch, and having gypsum plaster ceiling.	2½-hr.
Steel Joist Construction and Formed Steel Members (a)(e)(g) (Using Contact Furred, or Suspended Ceilings) (Constructions With Metal or Wire Lath—Except as Noted—Ceilings)	**Top Slab**—2½" poured concrete top slab or 2" precast gypsum tile, the latter with ½" mortar finish; or 2" reinforced gypsum concrete slab on ½" gypsum wallboard. **Ceiling**— ⅞" vermiculite-gypsum or perlite-gypsum plaster over face of metal lath.	4-hr.
	Top Slab—2½" poured concrete top slab, 2½" vermiculite-concrete or perlite-concrete top slab, or 2" precast gypsum tile, the latter with ½" mortar finish. **Ceiling**— ⅝" vermiculite-gypsum or perlite-gypsum plaster or ⅞" unsanded gypsum plaster over face of metal lath.	3-hr.
	Top Slab—2½" poured concrete top slab. **Ceiling**— ¾" sanded gypsum plaster (mix 1:2) over face of metal or wire lath.	2½-hr.
	Top Slab—2" poured concrete top slab or 2" percast gypsum tile, the latter with ¼" mortar finish. **Ceiling**— ⅝" vermiculite-gypsum or perlite gypsum plaster or ⅞" unsanded gypsum plaster over face of metal or wire lath.	2½-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
	Top Slab—2¼" poured concrete top slab or 2" precast gypsum tile, the latter with ¼" mortar finish. **Ceiling**— ⅝" sanded gypsum plaster (mix 1:2, 1:3) over face of metal or wire lath or paper-backed wire fabric.	2-hr.
	Top Slab—2" poured concrete top slab; or 2" precast gypsum tile. **Ceiling**— ⅝" sanded gypsum plaster (mix 1:2, 1:3) or ⅝" sanded portland cement plaster (mix 1:2, 1:3—with 15 lbs. hydrated lime and 3 lbs. short asbestos fiber per bag of portland cement) over face of metal lath.	1½-hr.
Steel Joist Construction and Formed Steel Members (a)(e)(g) (Using Contact, Furred, or Suspended Ceilings) (Constructions With Metal or Wire Lath—Except as Noted—Ceilings)	**Top Slab**—1" nominal single wood floor on wood nailers applied to steel deck with insulating paper cemented thereto; or double wood deck on wood nailers attached to steel joists or formed steel members. **Ceiling**— ⅝" sanded gypsum plaster (mix 1:2, 1:3) or ⅝" sanded portland cement plaster (mix 1:2, 1:3—with 15 lbs. hydrated lime and 3 lbs. short asbestos fiber per bag of portland cement) over face of metal or wire lath.	1-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
Steel Joist Construction and Formed Steel Members (a)(e)(g) (Constructions With Gypsum Lath Ceilings)	**Top Slab**—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 12", ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; 1" gypsum-perlite or gypsum-vermiculite plaster (100:2, 100:3), reinforced with 1" 20 gage hexagonal mesh attached to furring channels.	4-hr.
	Top Slab—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 12", ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; ⅝" gypsum-perlite or gypsum-vermiculite plaster (100:2, 100:3) reinforced with 14 gage galvanized wire below lath and diagonally between interlocking device of wire clips.	3-hr.
	Top Slab—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 16", ⅜" perforated gypsum lath attached to furring channels with approved interlocking clips; ½" gypsum-perlite or gypsum-vermiculite plaster (100:2½) reinforced with 1" 20 gage hexagonal mesh attached to furring channels.	3-hr.
	Top Slab—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 12", ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; ½" gypsum-perlite or vermiculite-plaster (100:2½) reinforced with 14 gage galvanized wire below lath and diagonally between interlocking device of wire clips and ⅝" gypsum acoustical plaster.	2½-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
Steel Joist Construction and Formed Steel Members (a)(e)(g) (Constructions With Gypsum Lath Ceilings)	**Top Slab**—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 16", ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; ½" gypsum-perlite or gypsum-vermiculite plaster (100:2½) reinforced with 14 gage galvanized wire below lath and diagonally between interlocking device of wire clips.	2-hr.
	Top Slab—2" poured concrete top slab. **Ceiling**— ¾" furring channels spaced 12" o.c. ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; ⅝" gypsum sand plaster (1:2, 1:3) reinforced with 14 gage galvanized wire below lath and diagonally between interlocking device of wire clips. (NBS Test No. 345).	2-hr.
	Top Slab—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 16", ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; 1" of gypsum-perlite or gypsum-vermiculite plaster (100:2, 100:-3).	1½-hr.
	Top Slab—2" poured concrete top slab. **Ceiling**— ¾" furring channels, spaced 16", ⅜" perforated gypsum lath attached to furring channels with approved interlocking wire clips; ⅝" gypsum-perlite or gypsum-vermiculite plaster (100:2½).	1-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
Steel Joist Construction and Formed Steel Members (a)(e)	**Top Slab**—2" poured concrete top slab. **Ceiling**— ¾" acoustical tile (glass fiber) attached to ¾" furring channels, 4' on center, with clips and splines — 2 layers of mineral wool (2" thick each) with aluminum foil center placed on top of unexposed surface of tile.	2-hr.
Cellular Steel Floor and Roof Units (b)(e)(g)	**Top Deck**—2" cinder concrete (minimum thickness over cells). **Ceiling**— ⅞" vermiculite-gypsum or perlite-gypsum plaster mix 100 lbs. gypsum to 2½ cu. ft. aggregate) over face of metal lath.	4-hr.
	Top Deck—2" concrete (minimum thickness over cells). **Ceiling**— ⅞" vermiculite-gypsum or perlite-gypsum plaster over face of metal lath.	4-hr.
	Top Deck—2½" concrete (minimum thickness over cells). **Ceiling**— ⅝" vermiculite-gypsum plaster plus ½" vermiculite acoustic plaster over face of metal lath.	4-hr.
	Top Deck—2" concrete (minimum thickness over cells). **Ceiling**— ⅞" unsanded gypsum plaster over face of metal lath.	4-hr.
	Top Deck—2½" concrete (minimum thickness over cells). **Ceiling**— 1" perlite-gypsum or vermiculite-gypsum plaster (mix 100 lbs. gypsum to 2½ cu. ft. aggregate) over face of ⅜" ribbed metal lath tied directly to underside of floor units.	4-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
	Top Deck—2½" concrete (minimum thickness over cells). **Ceiling**— ⅝" perlite-gypsum or vermiculite-gypsum plaster plus ½" gypsum acoustical plaster over face of metal lath.	4-hr.
	Top Deck—2½" concrete (minimum thickness over cells). **Ceiling**— ¾" furring channels spaced 12", ⅜" perforated gypsum lath attached to furring channels with approved interlocking clips; ½" vermiculite-gypsum or perlite-gypsum plaster (100:2½) reinforced with 14 gage galvanized wire below lath and diagonally between interlocking device of wire clips.	3-hr.
	Top Deck—3" expanded slag aggregate (minimum thickness over cells).	3-hr.
	Top Slab—4½" concrete (measured from bottom of corrugations). **Ceiling**— 1" vermiculite-gypsum or perlite-gypsum plaster over face of furred or suspended metal lath.	4-hr.
	Top Slab—4½" concrete (measured from bottom of corrugations). **Ceiling**— ⅜" vermiculite-gypsum or perlite-gypsum plaster over face of metal lath attached directly to bottom of floor units and with plaster pushed through lath to fill the corrugations of the units.	4-hr.
Corrugated Steel Floor Units (e)(g)	**Top Slab**—4½" concrete (measured from bottom of corrugations). **Ceiling**— ½" (measured from bottom of corrugations) vermiculite-acoustical plaster applied directly to underside of steel floor units.	4-hr.

TABLE 1007 (Continued)

Construction		Fire-Resistance Rating
	Top Slab—4½" expanded shale concrete (measured from bottom of corrugations). **Ceiling**— Not required.	3-hr.
	Top Slab—5¼" concrete (Grade A) (measured from bottom of corrugations). **Ceiling**— Not required.	2-hr.
	Top Slab—4½" concrete (Grade A) (measured from bottom of corrugations). **Ceiling**— Not required.	1-hr.
Corrugated Steel Roof Units (e)	**Top Slab**—3½" perlite concrete (measured from bottom of corrugation, average thickness 2⅝" perlite concrete) reinforced with welded wire mesh. **Ceiling**— Not required.	1-hr.
Ribbed Steel Roof Units (e)	**Top Slab**—3" vermiculite concrete (overall thickness) on ribbed steel roof unit with ribs extending up into concrete. Concrete reinforced with welded wire mesh. **Ceiling**— Not required.	1½-hr.
Steel Roof Deck Construction (c)(e)(g)	**Deck**— Steel deck covered with not less than 2" nominal thickness of vermiculite concrete, or equivalent. **Ceiling**—⅞" vermiculite-gypsum or perlite-gypsum plaster (mix 100 lbs. of gypsum to 2½ cu. ft. of vermiculite or perlite) over face of metal lath.	4-hr.

TABLE 1007 (Continued)

Construction			Fire-Resistance Rating
Steel Roof Deck Construction (c)(e)(g)	**Deck—**	Steel deck covered with not less than 1" nominal thickness of insulation board consisting of shredded wood bonded with portland cement, or equivalent.	
	Ceiling—	⅞" vermiculite-gypsum or perlite-gypsum plaster (mix 100 lbs. of gypsum to 2½ cu. ft of vermiculite or perlite) over face of metal lath.	3-hr.
	Deck—	Steel deck covered with not less than 1" nominal thickness of insulation board consisting of felted glass fiber or equivalent.	
	Ceiling—	⅞" vermiculite-gypsum or perlite-gypsum plaster (mix 100 lbs. of gypsum to 2½ cu. ft. of vermiculite or perlite) over face of metal lath.	2-hr.
	Deck—	Steel deck covered with not less than 1½" nominal thickness of wood fiber-board insulation, or equivalent.	
	Ceiling—	⅞" sanded gypsum plaster (mix 1:2) over face of metal lath.	2-hr.
	Deck—	Steel deck covered with not less than 1½" nominal thickness of insulation consisting of wood fiber and a cement binder, or equivalent.	
	Ceiling—	¾" sanded gypsum plaster (mix 1:2) over face of metal lath.	2-hr.
	Deck—	Steel deck covered with not less than 1" nominal thickness of wood fiber-board insulation, or equivalent.	
	Ceiling—	⅝" sanded gypsum plaster (mix 1:2, 1:3) over face of metal lath.	1½-hr.

Table 1007 (Continued)

Construction		Fire-Resistance Rating
	Ceiling Protection—⅝" sanded gypsum plaster (mix 1:2, 1:3, or ⅝" sanded portland cement plaster (mix 1:2, 1:3—with 15 lbs. of hydrated lime and 3 lbs. of short asbestos fiber per bag of portland cement)—plaster shall be applied over face of metal lath which shall be attached to joists as prescribed in Section 1001.7.	1-hr.
Wood Joist Construction (d)	**Ceiling Protection**—½" sanded gypsum plaster (mix 1:2) applied on ⅜" perforated gypsum lath which shall be nailed to joists in the manner prescribed in Section 1001.6. Joists of gypsum lath shall be covered with 3" strips of metal lath attached with 1¾", No. 12 gage nails having ½" heads, spaced not over 5" apart along joists, and 2 nails per joist for strips running perpendicular to the joists.	1-hr.
	Ceiling Protection—½" vermiculite-gypsum or perlite-gypsum plaster (mix 100 lbs. of gypsum to 2½ cu. ft. of aggregate) applied on ⅜" perforated gypsum lath which shall be nailed to joists in the manner prescribed in Section 1001.6.	1-hr.

Table 1007 (Continued)

Construction		Fire-Resistance Rating
	Ceiling Protection—Two layers of ½" gypsum wallboard (see Section 1001.6) separated by 20 gage galvanized wire fabric with 1" hexagonal mesh. First (upper) layer of gypsum wallboard applied to bottom of joists with 5d cement-coated box nails, No. 15 gage, 1⅝" long, with 7/32" diameter heads, at 18" c. to c., or equivalent. Wire fabric nailed over first layer of gypsum wallboard with 8d cement-coated box nails, No. 12½ gage, 2⅜" long, with ¼" diameter heads, at 5" to 7" c. to c., or equivalent. Second layer of gypsum wallboard nailed with 8d cement-coated box nails No. 12½ gage, 2⅜" long, with ¼" diameter heads, at 5" to 7" c. to c., or equivalent.	1-hr.
	Ceiling Protection—⅝" vermiculite-gypsum or perlite-gypsum plaster applied over face of metal lath which shall be attached to joists as prescribed in Section 1001.7.	1-hr.

Table 1007 (Continued)

Construction		Fire-Resistance Rating
	Ceiling Protection—One layer of ⅝" gypsum wallboard with a specially formulated core which provides greater fire-resistance than regular wallboard of the same thickness. Wallboard nailed with 1⅞ inch nails, 6 inches on centers, or equivalent.	1-hr.

Reference Notes to Table 1007 — Fire-Resistance Ratings for Floor and Roof Construction

(a)—Steel Joist Construction and Formed Steel Members:

Construction:

Top slabs or top decks as prescribed in Table 1007, supported on open or solid-web steel joists, formed steel members, or rolled steel beams, having plaster ceilings applied on metal or wire lath attached directly to the under side of the steel members or furred or suspended therefrom, or applied on perforated gypsum lath furred therefrom.

Metal or wire lath of approved weight serving as a form for poured top slabs may be considered as reinforcement. Where a steel deck provides the load carrying properties, reinforcement of the concrete or gypsum fill may be omitted.

Specified slab thicknesses shall be measured from the top of supporting steel members. If precast top decks of concrete or gypsum are used, joints shall be grouted or be so constructed to provide tight end and side joints. Mortar finish shall be applied to top of 2" precast slabs to make up the prescribed thickness of top slab when thicknesses greater than 2" is required.

(b)—Cellular Steel Floor and Roof Units—Construction composed of steel formed into units of two or more cells; depth of units not less than 1⅝ inches and distance between cells not less than 2 inches. The top deck and ceiling protection shall be as prescribed in Table 1007. Except as otherwise noted, the ceiling shall be furred or suspended so as to form an airspace between underside of cellular panel and back of lath.

(c)—**Steel Roof Deck Construction**—Steel deck covered with insulation of the kind and thickness not less than that prescribed in Table 1007, or equivalent and supported on steel framing, protected with a suspended ceiling of metal and plaster as prescribed for the ratings indicated.

(d)—**Wood Joist Construction** — Double wood floor (sub-floor ¾" sheathing, or ½" plywood, finish floor tongue and groove) with insulating paper between, supported on 2" x 10" wood joists spaced 16" on centers and having plaster or gypsum wallboard ceiling as prescribed in Table 1007.

(e)—The ratings given in Table 1007 for steel joist construction and formed steel members, cellular steel floor and roof units, corrugated steel floor units, corrugated steel roof units, ribbed steel roof units and steel roof deck construction are also applicable to steel beams, girders and trusses protected in the same manner, with non-combustible construction above.

(f)—Where electrical raceways and junction boxes are used in slab an additional thickness of 2" of concrete is required.

(g)—Fire-resistive ceilings which constitute an essential part of a non-combustible floor or roof assembly to meet a required fire-resistance rating may have openings to accommodate non-combustible piping, ducts and electrical outlets. The aggregate area of such openings in the ceiling shall be not greater than 100 square inches for each 100 square feet of ceiling area. The fixtures and attachments shall be installed so as not to decrease the fire resistance of the assembly. All duct openings shall be protected with approved non-combustible fire dampers.

(h)—**Fire-Resistance Ratings for Ceilings Protecting Non-Combustible Construction**—The fire-resistance rating of any ceiling described in Table 1007 for floor and roof construction shall be accepted as having the same fire resistance rating as a ceiling protecting structural members of steel or other non-combustible construction above the ceiling as is designated for floor and roof construction in Table 1007, provided there are no combustible materials above the ceiling.

CHAPTER XI

EXIT REQUIREMENTS

SECTION 1101 — GENERAL PROVISIONS

In every building hereafter erected, exits shall comply with the minimum requirements of this Chapter except those exits which are not required or which are not accessible for public use.

Exits shall consist of continuous and unobstructed means of egress to the exterior of a building at all times.

Where unusually hazardous conditions exit, additional exit facilities shall be provided as ordered by the Building Official, when necessary to assure the safety of the occupants.

No building shall hereafter be altered so as to reduce the number or width of exits to less than required by this Chapter nor shall any change of occupancy be made in any building unless such building conforms with the requirements of this Chapter.

For exit requirements in Group E, Assembly occupancies, see Section 512.5 to 512.18, inclusive.

SECTION 1102 — PERMISSIBLE EXITS

Exits shall consist of continuous means of egress to the exterior of a building by stairways, escalators, horizontal exits, doorways providing direct exit to a street or to an exterior open space leading to a street, passageway, or ramps, conforming with the requirements of this Chapter and providing that all such exits shall be enclosed and separated from the rest of the building as provided in Section 701. Elevators shall not be considered as providing exit facilities required by this Chapter except as provided in Section 1115.

Stairways, ramps and passageways used for required exits shall be of non-combustible construction except where otherwise specifically permitted by Sections 1108, Stairways; 1111, Passageways; and 1112, Ramps.

SECTION 1103 — NUMBER AND ARRANGEMENT OF EXITS

1103.1 — ARRANGEMENTS

Exits shall be so located that the distance from an exit to the most remote point in the floor area, room, or space served by them (in office buildings, hotels and apartments where floor areas are subdivided into small spaces or rooms, the distance of travel to an exit shall be measured from the corridor entrance to such rooms or spaces) measured along the line of travel, shall be not more than that speci-

fied below, except that where sprinklers are installed throughout a building, maximum distance of travel to an exit may be thirty-three and one-third (33⅓) per cent greater than these tabular values, provided sprinkler equipment is not required by this Code for such building:

OCCUPANCY	Maximum Distance of Travel to an Exit. (Lin. Ft.)
Group A, Residential	100
Group B-1, Business, Offices	150
Group B-2, Business, Mercantile	100
Group C, Schools	75
Group D, Institutional	85
Group E, Assembly	100
Group F, Storage	100
Group G, Industrial	100
Group H, Hazardous	75

1103.2 — NUMBER OF EXITS

Every room or floor space of a building, occupied by seventy-five (75) persons or more, or occupied by a Group H, Hazardous occupancy, shall have not less than two (2) doorways or independent exits, located as remote as practicable from each other.

There shall be not less than two (2) exits or two (2) exit stairways serving every floor area, except that in the following cases there may be access to one (1) exit provided such exit is enclosed by construction as specified in Section 701, but affording in no case less than 1-hour fire-resistance.

Where one exit is permitted:

In Group A, Residential Buildings having no floor over three thousand five hundred (3,500) Sq. Ft. in area, of Type I, Fireproof or of Type II, Fire-Resistive construction, or of other types of construction provided not over two stories in height. Maximum distance of travel to an exit shall not exceed 30 feet.

In Group B, Business Buildings having no floor area over three thousand five hundred (3,500) Sq. Ft. in area, of Type I, Fireproof or of Type II, Fire-Resistive construction, or of other types of construction provided not over two stories in height. Maximum distance of travel to an exit shall not exceed 50 feet and occupant content shall not exceed 40 persons above the street floor.

Sufficient exit facilities shall be provided so that the aggregate capacity of all such exits, determined in accordance with this Chapter, shall be not less than the actual number of persons in the area served, but in no case less than the occupant content as determined from Section 1105.

It shall be unlawful to occupy any part of a building by a greater number of persons than that for which exit capacity, as prescribed in this Chapter, has been provided.

SECTION 1104 — SPECIAL EXIT REQUIREMENTS

In Group D Institutional occupancies every area housing bedridden patients shall have access to a horizontal exit, ramp or passageway, leading to the exterior and having a width of not less than five (5) feet, located within a distance of travel not exceeding eighty five (85) feet or not exceeding one hundred twenty-five (125) feet if the building is equipped with sprinklers throughout. Corridor dead-ends shall not exceed ten (10) feet in length.

Exits for Group E Assembly occupancies shall be as required by Sections 512.8 to 519.19.

In rooms in which are located steam boilers, oil-fired incinerators, or apparatus using or producing gas or vapor, the maximum distance of travel to an exit shall not exceed 20 feet. Where two exits are required one may have a width of not less than two feet no inches (2'0").

SECTION 1105 — EXIT CAPACITY REQUIREMENTS

1105.1 — OCCUPANT CONTENT

For determining the exits required, the minimum number of persons or the occupant content of any floor area shall in no case be taken less than specified below:

Occupancy	Minimum Occupant Content Floor Area Per Person
Group A—Residential	125 Sq. Ft.
Group B—Stores—street floor and sales basements	30 Sq. Ft.
—upper sales floors	60 Sq. Ft.
Office Building and other Group B occupancies	100 Sq. Ft.
Group C—Schools—classrooms and recreation	20 Sq. Ft.
—laboratories, museums, libraries, and similar rooms	30 Sq. Ft.
—shops, vocational, administrative rooms	100 Sq. Ft.
—gymnasiums	15 Sq. Ft.
Group D—Institutional	125 Sq. Ft.
Group E—Assembly—See Section 408.3	
Group F—Storage	300 Sq. Ft.
Group G—Industrial	100 Sq. Ft.
Group H—Hazardous	100 Sq. Ft.

1105.2 — CAPACITY OF STAIRWAYS

The capacity of exit stairways constructed in accordance with Section 1108 shall not exceed that specified below.

Any given stairway meeting the requirements of this Chapter, may be used as a required exit from all floors which it serves. If, for example, three (3) stairways are required to serve the third floor of a building and a like number are required for the second floor, the total number of stairways required shall be three, not six.

There shall be not less than two (2) exits, or exit stairways, serving each floor, except as otherwise permitted in Sections 1103.2 and 1104.

MINIMUM EXIT STAIRWAY REQUIREMENTS

Occupancy for All Types	Max. No. of Occupants Per Floor Per 44" Wide Stairway	Max. Allowable Floor Area Per Floor Per 44" Wide Stairway—Sq. Ft.
Group A—Residential	60	7,500
Group B—Stores, Street Floor and Sales Basement	120	3,600
Group B—Stores, Upper Sales Floor	120	7,200
Group B—Office Buildings and Others	120	12,000
Group C—Schools*	120	*
Group D—Institutions	60	7,500
Group E—Assembly	See Section 512.5 to 512.13	
Group F—Storage	120	36,000
Group G—Industrial	120	12,000
Group H—Hazardous	60	6,000

*For rooms with seventy-five (75) or more occupants, See Section 408—Assembly Occupancy and detail requirements in Section 512.5 to 512.13.

*See Section 1105.1 for occupant content of rooms in schools.

Refer 514 for Churches.

1105.2 — CAPACITY OF STAIRWAYS

The maximum exit capacity of exit stairways complying with the requirements of Section 1108 but having a minimum width greater than forty-four (44) inches shall be determined as follows:

Minimum stairs width 44" to 56"—Capacity same as 44" wide stairway
Minimum stairs width 56" to 66"—Capacity 25% larger than 44" wide stairway
Minimum stairs width 66" to 78"—Capacity 50% larger than 44" wide stairway
Minimum stairs width 78" to 88"—Capacity 75% larger than 44" wide stairway
Minimum stairs width 88" and over—Capacity 100% larger than 44" stairway

1105.3 — CAPACITY OF DOORWAYS AND HORIZONTAL EXITS

The exit capacity of a doorway or a horizontal exit complying with the requirements of this Chapter, shall be based on the clear width of the opening between jambs, and shall not exceed:

Doorway Width	Capacity Number of Occupants
Clear Width—36" to 44"	150
Clear Width—44" to 56"	200
Clear Width—56" to 66"	250
Clear Width—66" to 78"	300
Clear Width—78" to 88"	350
Clear Width—88" or over	400

Doorways or horizontal exits of sufficient number and width shall be provided to have capacity not less than the actual number of persons to be accommodated within the floor area served, except that in no case shall the number of occupants be taken less than the occupant content as figured from the gross floor area in accordance with Section 1105.1, occupant content.

The aggregate width of exit doorways or exit openings through which an exit stairway discharges shall be at least equal to the width of that stairway. If there is more than one (1) such tributary exit stairway, the exit doorways shall be at least equal in aggregate width to three-fourths (¾) the combined width of such exit stairways, except as otherwise specified for street floors. The width of exit doorways shall be further increased to provide for any additional persons on the floor served by such exit doorways.

Street floor exit doorways shall aggregate the width of stairways, ramps, and escalators, serving upper floors and basements, and shall have the additional width necessary to provide for the occupants accommodated on the street floor.

1105.4 — CAPACITY OF PASSAGEWAYS AND CORRIDORS

Width and exit capacity of passageways and corridors shall be not less than that required for the exit doorways leading from them in the direction of travel to the exterior. See Section 1105.3 and Section 1111.

1105.5 — CAPACITY OF RAMPS

Width and exit capacity of ramps shall be the same as specified for stairways. See Section 1105.2 and Section 1112.

1105.6 — CAPACITY OF ELEVATORS

For the purpose of meeting the exit requirements of this Chapter the exit capacity of one (1) passenger elevator shall in no case be taken as more than twenty (20) persons or the capacity of the elevator. See requirements of Section 1115 relative to use of elevators as required exits.

1105.7 — CAPACITY OF ESCALATORS OR MOVING STAIRS

The width and exit capacity of escalators complying with the requirements of Section 1116 shall be as specified for stairways except that the maximum width of escalators shall not exceed 48".

SECTION 1106 — EXIT ENCLOSURES

Exits required by this Chapter shall be completely enclosed and protected from the rest of the building, as required by Section 701.

SECTION 1107 — EXIT OUTLETS

Every required exit shall provide continuous and protected egress discharging finally into a street, an open space leading to a street, or into an exit court or passageway leading to a street or into an approved open space having access to a street.

Such exit courts or passageways shall be enclosed with construction providing the degree of fire-resistance specified in Section 701 but in no case less than 2-hours fire-resistance.

The width of such courts or passageways shall be not less than the width of the exits tributary thereto. There shall be no reduction of width in the direction of exit travel.

Slope of floors in exits shall not exceed one in ten.

SECTION 1108 — STAIRWAY CONSTRUCTION

1108.1 — GENERAL

Exit stairways shall be constructed of non-combustible materials throughout in the following buildings:

All buildings of Type I, Fireproof and of Type II, Fire-Resistive construction.

All buildings of Group C, Schools over 2 stories, of Group D, Institutions, and theaters of Group E-1 Assembly Occupancy and Group E-2 over 2 stories.

All other buildings four (4) stories or more in height, or occupied by more than forty (40) persons above or below the first story at street or grade level.

All exit stairs or stairways in buildings over two stories in height shall be constructed entirely of non-combustible materials, except 1- and 2-family dwellings.

When treads or landings are of slate, marble, stone, or composition, they shall be suitably supported for their entire length and width.

All exit stairways shall have solid risers.

Stairs constructed of wood shall be firestopped as specified in Section 705.

Except in 1- and 2-family dwellings which are less than three (3) stories in height. No closet shall be located beneath stairs that are in whole or part of combustible construction; such space shall be left entirely open and free from encumbrance.

Except in 1- and 2-family dwellings the underside of stairways, if of combustible construction, shall be protected to provide not less than 1-hour fire-resistance.

1108.2 — BASEMENT STAIRS

(a) In Group E Theaters and Assembly occupancies, no exit stair or stairway from a lower story shall lead to an exit doorway serving an exit stair or stairway from an upper story.

(b) In no case shall a stair or stairway from a lower story lead to an exit doorway serving an exit stair or stairway from an upper story, unless such stair or stairway from below is separated at its upper end from the stair or stairway from above by partitions of 2-hour fire-resistance.

1108.3 — TREADS AND RISERS

Treads and risers of required stairs shall be so proportioned that the sum of two (2) risers and a tread, exclusive of projection or nosing, is not less than twenty-four (24) inches nor more than twenty-five (25) inches. The height of riser shall not exceed seven and three-quarter (7¾) inches in height, and treads, exclusive of nosing, shall be not less than nine (9) inches wide. Every tread less than ten (10) inches wide shall have a nosing, or effective projection, of approximately one (1) inch over the level immediately below that tread.

Treads shall be of uniform width and risers of uniform height in any one flight of stairs.

The use of winders and/or spiral stairways, is prohibited in stairways serving as required exits.

1108.4 — LANDINGS

No flight of stairs shall have a vertical rise of more than twelve (12) feet between floors or landings; provided that in stairways serving as exits in buildings of Group E Theater and Assembly occupancies, such vertical rise shall not exceed eight (8) feet between landings.

The length and width of landings shall be not less than the width of stairways in which they occur.

In buildings of Group E Assembly occupancies, flights of less than three risers shall not be used in stairways, interior or exterior, passageways, at entrance or elsewhere in connection with required exits. To overcome lesser differences in level. gradients not exceeding one (1) in ten (10) may be used.

1108.5 — HANDRAILS

Except where permitted in aisles, stairs shall have walls or well-secured handrails or guards on both sides of stairs of not less than thirty-two (32) inches high. Stairs of less than forty-four (44) inches in width may have handrails on one side only. Horizontal runs of rails around open wells shall be not less than 36 inches high.

When the required width of a flight of stairs exceeds eighty-eight (88) inches, one or more intermediate handrails, continuous between landings, substantially supported and terminating at the upper end in newels or standards shall be provided and there shall be not more than sixty-six (66) inches between such adjacent handrails.

1108.6 — WIDTH

Stairs serving as required exits, shall be at least forty-four (44) inches wide except that in 1- or 2-family dwellings, in Group B, Business ocupancies accommodating not over thirty-five (35) persons and for stairs leading to roofs, not occupied, the width may be thirty-six (36) inches. All such widths shall be clear of all obstructions except that handrails attached to walls may project not more than three and one-half (3½) inches at each side within the required width.

Width of stairs shall not decrease in the direction of exit travel.

SECTION 1109 — FIRE ESCAPES

Fire escapes, or outside stairs not meeting the requirements of this chapter, shall not be permitted except as approved by the Building Official for existing buildings not over four (4) stories in height, where additional exits are necessary and conditions do not permit the use of more adequate exit facilities.

Exterior fire escapes constructed by the direction of the Building Official on buildings heretofore erected, shall conform so far as possible with the requirements of this chapter. Fire escapes shall be constructed of non-combustible material and shall be arranged and located so that they can readily be reached by occupants of the building and so that safe egress is provided at the foot of the fire escape.

Wall openings adjacent to fire-escapes shall be protected with approved fire-resistive windows or doors.

Metal Guards—Exterior stairways, unless otherwise enclosed by non-combustible materials, shall be provided throughout with metal mesh or other rigid guards at least four (4) feet high on each unenclosed side of such stairway. All glass used in the construction of such enclosures shall be wired glass.

SECTION 1110 — DOORWAYS

Every exit doorway shall open into an enclosed stairway, a horizontal exit, a fire protected corridor or passageway, meeting the requirements of this chapter and providing continuous protected egress to a street, or to an exterior open space leading to a street.

No exit doorway shall be less than thirty-six (36) inches in width except that in Group D, Institutional occupancies, doorways serving as exits for areas housing bedridden patients shall be not less than sixty (60) inches in width.

Exit doors shall swing in the direction of exit and shall not obstruct the travel along any required exit, except that doors swung flat against the walls may project not more than six (6) inches. No door shall at any point in its swing reduce the required width of an exit stairway or landing to less than thirty-six (36) inches nor interfere with full use of the stairs.

No exit doorway shall open immediately upon a flight of stairs. A landing of at least the width of door shall be provided.

Exit doors shall open from the inside without the use of a key, except in places of detention where approved releasing devices shall be provided for emergency use.

Exit doors of Group C, School and Group E, Assembly occupancies shall be equipped with approved latches (fire exit bolts) and approved releasing devices operating in the direction of exit travel and extending not less than two-thirds (⅔) of the door width, which release when pressure of fifteen (15) lbs. or less is applied.

For required width of doorways serving exit stairways and the exit capacity of doorways, see Section 1105.3.

Revolving Doors—Revolving doors shall not be used as required exits unless exit doors of required width are installed adjacent thereto. Revolving doors shall be of approved collapsible type.

Special Doorway Requirements—No door, when opening or when fully open shall project beyond the building line. (See Chapter XXII, Use of Public Property). Every door used as a means of egress or ingress in cafes, restaurants, or in any building of Group E, Assembly Occupancy, shall be considered as an exit doorway and shall meet all the requirements as set forth in this section.

SECTION 1111 — EXIT PASSAGEWAYS AND CORRIDORS

Exit corridors and exit passageways shall be of width not less than the aggregate required width of the exit doorways leading from them in the direction of travel to the exterior.

Exit corridors or passageways shall be enclosed and protected from the rest of the building by the following construction: In buildings up to three stories in height, one-hour fire-resistive protection shall be required. In buildings over three stories in height, 2-hour fire-resistive protection shall be provided. Where stairways discharge through fire-resistive passageways, such passageways shall be not less than eight (8) feet in height.

Corridors in School occupancies shall be at least eight (8) feet wide.

SECTION 1112 — RAMPS

The width and enclosure of exit ramps shall be as required for exit passageways. The slope of a ramp shall not exceed one (1) in ten (10).

Surface of ramps shall be of non-slip material.

Exit ramps shall be of non-combustible construction except as otherwise permitted for stairs.

Ramps shall comply with all requirements for stairways so far as those requirements are applicable.

SECTION 1113 — HORIZONTAL EXITS

A horizontal exit is a horizontal passageway through a fire wall or through a two-hour fire-resistive partition into another building or into another section of the same building, provided however, that except in the case of mechanical or equipment rooms horizontal exits may comprise not more than fifty percent (50%) of the required exits from any building or floor area except rooms.

The width of horizontal exits shall be not less than required for exit doorways. The exit capacity of horizontal exits shall be as specified in Section 1105.2.

Horizontal exits shall be equipped with at least one (1) approved fire door of a self-closing type. Door openings shall be protected as specified in Section 703.

Floor area on either side of a horizontal exit shall be sufficient to hold the occupants of both floor areas served, allowing not less than three (3) Sq. Ft. net clear area per person.

The area into which a horizontal exit leads shall be provided with exits adequate to meet the requirements of this Chapter, at least one of which shall lead directly to the exterior.

Where there is a difference of level between connected areas, ramps, not steps, shall be used, meeting the requirements of Section 1112.

Doors in horizontal exits shall be kept unlocked and unobstructed.

SECTION 1114 — EXIT TO ROOF

In all buildings over three (3) stories in height, of other than Type I, Fireproof or Type II, Fire-Resistive construction, one enclosed exit stairway shall be continued from street grade level to or through roof level except where roofs have a slope greater than one (1) in four (4). Such stairway shall be marked at street and floor levels with a sign indicating that it continues to the roof.

Where roofs are used for roof gardens or for other purposes, however, stairways shall be provided as required for such use or occupancy.

Where no stairway extends to the roof, scuttles shall be provided of size not less than two (2) feet by three (3) feet, giving access to the roof.

SECTION 1115 — ELEVATORS

Elevators, arranged with two (2) or more elevators in a common shaft, may be accepted as one of two required means of exit for office buildings of Type I Fireproof or of Type II Fire-Resistive construction only, provided such use is approved by the Building Official, but only two (2) elevators in such shaft shall be counted for exit purposes.

Elevator shafts whether included as required exits or not shall be enclosed and protected from the rest of the building as specified in Section 701.

Elevators shall not be located in a common enclosing shaft with an exit stairway.

Elevators constituting required means of egress shall discharge at the street floor into a fire-resistive corridor or passageway which shall lead directly to the street.

Elevators shall conform with the requirements of the "Safety Code for Elevators, Dumbwaiters and Escalators ASA-A17.1-1960" or the "Safety Code for Private Residence Elevators ASA-A17.15-1960", of the American Standards Association, as applicable unless otherwise specified.

Exit capacity of elevators shall not exceed that specified in Section 1105.6.

SECTION 1116 — ESCALATORS OR MOVING STAIRS

Only escalators of the horizontal tread type, which normally operate in the direction of exit travel shall be used as a required means

of exit. Except in Group C, School occupancies, such escalators may be used as required exits provided they comply with all the requirements applying to exit stairways and are enclosed and protected from the rest of the building as required for exit stairways.

Unless otherwise specified, escalators shall comply with the requirements for escalators in the "Safety Code for Elevators, Dumbwaiters and Escalators ASA-A17.1-1960", of the American Standards Association.

No individual escalator unit shall have a vertical travel of more than two (2) stories or thirty-five (35) feet, or a width exceeding forty-eight (48) inches.

For exit capacity of escalators see Section 1105.7.

SECTION 1117 — EXIT SIGNS

Exits shall be indicated by approved signs or lights at all times when the building is occupied.

Every exit in Group E Assembly occupancies and every other exit serving more than one hundred (100) persons shall be marked with illuminated signs as provided in Section 512.16.

Where exit lights or signs or the exits themselves are not visible from the exit approach, directional signs indicating the way of egress shall be provided. The level at which there is direct exit to the exterior shall also be clearly indicated.

Lighting of exit signs shall be from a source independent of the general building lighting in buildings of Group E, Assembly occupancy or department stores having over five thousand (5,000) Sq. Ft. area on any one sales floor, in hotels with sleeping accommodations for more than one hundred (100) persons and in Group D, Institutional occupancies.

SECTION 1118 — ILLUMINATION OF EXITS

Exits shall be illuminated at all times when the building is occupied with light of not less than one foot candle intensity at the floor level.

Artificial lighting when necessary to meet the requirements of this Section, shall be from a source independent of the general building lighting in buildings of Group E, Assembly occupancy, of Group D, Institutional occupancy, in hotels with sleeping accommodations for more than one hundred (100) persons, and in department stores of over five thousand (5,000) Sq. Ft. area on any one sales floor.

SECTION 1119 — FIRE ALARM

An approved fire alarm system shall be installed in every building (except dwellings and apartments) used as sleeping quarters by twenty (20) or more persons; in every building used above or below street floor by forty (40) or more persons, or used above the second floor or in sub-basements by twenty (20) or more persons; and in buildings of Group H, Hazardous occupancies.

CHAPTER XII

MINIMUM DESIGN LOADS

SECTION 1201 — GENERAL

Every building and structure shall be of sufficient strength to support the imposed live, dead and wind loads and impact loads, if any, without exceeding, in any of its structural elements, the stresses prescribed elsewhere in this code.

SECTION 1202 — DEAD LOADS

The dead load of a building or other structure is the weight of all permanent construction, such as floors, roofs, permanent partitions, stairways, and walls. (See Appendix for weights of construction materials).

SECTION 1203 — LIVE LOADS

SECTION 1203.1 (a) — FLOOR LOADS

Uniformly Distributed Loads—The live loads assumed for purposes of design shall be the greatest loads that probably will be produced by the intended uses and occupancies; provided that the minimum live loads to be considered as uniformly distributed shall be as given in the following table.

OCCUPANCY	Minimum Live Loads Lbs. Per Sq. Ft.
Apartments	40
Armories	150
Assembly Places—Fixed Seats	50
Assembly Places—Movable Seats	100
Balconies and Galleries—Fixed Seats	60
Balconies and Galleries—Movable Seats	60
Cornices	60
Corridors, Public	100
Dance Halls	120
Drill Rooms	150
Driveways and Yards	250**
Dwellings	40
One-Story Dwellings	30
Exterior Balconies	100
Fire Escapes	100
Garages and Trucking Spaces	120*
Gymnasiums, Main Floor and Balcony	100
Hospitals—Wards and Rooms	40
Hotels—Guest Rooms and Private Corridors	40
Libraries—Reading Rooms	60

Libraries—Stack Rooms	125
Manufacturing—Light	100
Manufacturing—Heavy	150
Offices	50
Open Parking Decks	75 (a)
Printing Plants—Press Room	150
Printing Plants—Composing and Linotype Rooms	100
Public Rooms	100
Rest Rooms	50
Reviewing Stands and Bleachers	100
Roof Loads	(See Sections 1203.2 and 1205.3)
Schools—Class Rooms, including Sunday Schools	40
Sidewalks	200**
Skating Rinks	100
Stairways, Public	100
Storage—Light	125
Storage—Heavy (Load to be determined from proposed use or occupancy, but never less than)	250
Stores—Retail (Light Merchandise)	75
Stores—Wholesale (Light Merchandise)	100
Theaters	
Corridors, Lobbies, and Standing Space	100
Orchestra Floor and Aisles	50
Balconies	50
Stage Floor	150

*Design shall provide for maximum wheel loads. See Section 1203.1 (d) Concentrated Loads. (a) Passenger Cars only.

**See also Section 1203.3 (a) Sidewalks.

1203.1 (b) — ITEMS NOT SPECIFICALLY COVERED

For occupancies not listed above, the live load shall be approved by the Building Official.

1203.1 (c) — PROVISION FOR PARTITIONS

The actual weight of all permanent partitions shall be included in the dead load. Where partitions are likely to be used, although not definitely located, or where they are likely to be shifted, twenty (20) pounds per square foot shall be added to the dead load in the areas supporting them, except in the case of light partitioning.

1203.1 (d) — CONCENTRATED LOADS

In the design of floors, probable concentrated loads shall be considered. Where such loads may occur, the supporting beams, girders and slabs shall be designed to carry either the concentrated loads or the live load described in Section 1203.1 (a), whichever produces the greater stresses.

1203.1 (e) — REDUCTION OF LIVE LOAD

No reduction shall be applied to the roof live load.

No reduction of the live load shall be allowed in the design of any slabs, or joists.

In designing a column, girder, truss, wall, pier or foundation carrying more than one floor, the live loads of the floors which are supported by such members may be reduced, except in buildings used for storage or warehouse purposes. The reduced load shall be figured over the entire tributary floor area, and shall be not less than the following percentages of the live load for which such floors were designed:

100 per cent for members carrying one (1) floor.
90 per cent for members carrying two (2) floors.
80 per cent for members carrying three (3) floors.

and at corresponding decreasing percentages for each successive floor. In no case, however, shall the load be less than seventy per cent of the live load for any floor in industrial buildings, stores or garages, or fifty per cent for any floor in buildings of occupancies other than those for which specific provision is made herein.

Except as above provided, beams, girders and trusses shall be designed to support the full dead and live loads; provided that in buildings other than those used for storage or warehouse purposes, beams, girders or trusses carrying three hundred square feet or more of tributary floor area may be designed to carry eighty-five (85) per cent of the live load and the full dead load. This load reduction shall not be used in addition to the above reductions.

1203.1 (f) — RESTRICTIONS ON LOADING

It shall be unlawful to place, or cause or permit to be placed, on any floor or roof of a building or other structure a load greater than is permitted by these requirements.

1203.2 — ROOF LIVE LOADS

Where the rise is less than thirty degrees (30°), roofs shall be designed for a vertical live load only of not less than twenty (20) pounds per square foot of horizontal projection applied to any and all slopes; when the rise is greater than thirty degrees (30°) the roof shall be designed for wind load only.

Design requirements for wind pressures shall be as specified in Section 1205.3.

Roofs intended for use as floors, shall be designed for the floor live load, determined by the intended occupancy, Table 1203.1.

The foregoing provisions of this section shall not apply to glazed greenhouse roofs.

1203.3 — OTHER LIVE LOADS

SIDEWALKS—Sidewalks shall be designed to carry either a uniformly distributed load of two hundred (200) pounds per square foot or a concentrated load of eight thousand (8,000) pounds on a space two and one-half (2½) feet square and placed in any position, whichever will produce the greater stresses. (This does not apply to sidewalks on grade).

1203.4 — IMPACT AND CRANE RUNWAYS

All moving loads shall be increased by not less than twenty-five (25) per cent to provide for impact except that supports for elevators shall provide for one hundred (100) per cent increase of live load.

The lateral force on crane runways to provide for the effect of crane trolleys shall be not less than twenty-five (25) per cent of the lifted load plus weight of the crane trolley but exclusive of other parts of the crane, applied at the top of rail, one-half (½) on each side of runway, and considered as acting in either direction normal to the runway rail. The longitudinal force on crane runways shall be taken as not less than twelve and one-half (12½) per cent of the wheel loads of the crane, applied at top of rail.

1203.5 — LOAD TESTS

The Building Official may require a load test of any construction whenever there is reason to question its safety for the intended use. Such tests are to be made at the expense of the owner or his agent. The construction shall sustain a superimposed load equal to twice the design live load and shall recover at least seventy-five (75) per cent of its maximum deflection within twenty-four (24) hours after the load is removed.

SECTION 1204 — SPECIAL LOADS

1204.1 — SOIL PRESSURES ON BASEMENT WALLS AND FLOORS

In the design of basement walls and similar approximately vertical structures below grade, provisions shall be made for lateral pressure of adjacent soil. Due allowances shall be made for possible surcharge from fixed or moving loads.

In the design of basement floors and similar approximately horizontal constructions below grade, the upward pressure of water, if any, shall be taken as the full hydrostatic pressure applied over the entire area. The hydrostatic head shall be measured from the underside of the construction.

1204.2 — RAILINGS

Stairway railings, both exterior and interior shall be designed to resist a horizontal thrust of twenty (20) pounds per linear foot applied at the top of the railing.

Balcony railings, both exterior and interior, shall be designed to resist a horizontal thrust of fifty (50) pounds per linear foot applied at the top of the railing.

1204.3 — SUPPORTS FOR WALKWAYS

Where walkways are to be installed above ceilings, supports shall be designed to carry a load of two hunded (200) pounds occupying a space two and one-half (2½) square feet, so placed as to produce maximum stresses in the affected members.

SECTION 1205 — WIND LOADS

1205.1 — MINIMUM DESIGN LOADS

Buildings or other structures shall be capable of withstanding the horizontal loads shown in the following table and, applied in each zone, allowing for wind from any direction. The first height zone shall be measured above the average level of the ground adjacent to the building and the subsequent height zones shall be added progressively upward to the overall height of the building.

DESIGN WIND PRESSURE FOR VARIOUS HEIGHT ZONES OF BUILDINGS OR OTHER STRUCTURES

Height Zone Ft.	Horizontal Loads Lb./Sq. Ft.	
	For Southern Inland Regions	For Southern Coastal Region*
Less than 30	10	25
31 to 50	20	35
51 to 99	24	45
100 to 199	28	50
200 to 299	30	50
300 to 399	32	50
Over 400	40	50

*Coastal regions is that area lying within 125 miles of the coast and subject to hurricanes, tropical disturbances and occasional winds attaining exceptionally high wind velocities.
(See Appendix "D" for Hurricane Anchors)

1205.2 — EXTERIOR WALLS

Every exterior wall shall be capable of withstanding the loads specified in the above table, acting either inward or outward.

1205.3 — ROOFS — WIND LOADS

The roofs of all buildings or other structures shall be designed to withstand loads acting outward normal to the surface equal to

one and one-quarter (1¼) times the horizontal loads specified for the corresponding height zone in which the roof is located. The height is to be taken as the mean height of the roof structure above the average level of the ground adjacent to the building or other structure. The load is to be applied over the entire roof.

Roofs with slopes greater than thirty degrees (30°) shall withstand resulting loads acting inward normal to the surface equal to those specified for the height zone in which the roof is located, the load to be applied to the windward slope only.

Overhanging eaves and cornices shall be capable of withstanding upward loads equal to twice those specified.

Adequate anchorage of the roof to the walls and columns and of walls and columns to the foundations shall be required in all cases.

1205.4 — CHIMNEYS

Chimneys of circular cross section shall be capable of withstanding sixty (60) per cent of the loads specified. Chimneys of square or rectangular cross section shall be capable of withstanding the full loads specified.

1205.5 — SIGNS

Ordinary solid signs erected on ground level shall be capable of withstanding a load of fifteen (15) pounds per square foot. Solid signs on the roofs of buildings or other structures shall be capable of withstanding the loads specified in Section 1205.1 corresponding to the height of the center of the sign. Signs in which the open area is less than twenty-five (25) per cent of the gross area shall be considered to be solid signs and the gross area shall be used in computing the load.

Open signs erected at ground level shall be capable of withstanding a pressure of thirty (30) pounds per square foot, applied to the projected area of the members. Open signs on the roofs of buildings or other structures shall be capable of withstanding twice the loads specified in Section 1205.1 corresponding to the height of the center of the sign, applied to the projected area of the members.

1205.6 — OTHER STRUCTURES

The Building Official may require evidence to support the values of the wind load used in the design of structures not specifically covered by this section.

1205.7 — SHIELDING AND UNUSUAL EXPOSURES

No allowance shall be made for the shielding effect of other buildings or structures.

If the building or other structure is on an ocean promontory, or in any other location considered by the Building Official to be unusually exposed, higher wind loads may be specified by the Building Official.

1205.8 — OVERTURNING MOMENT

The overturning moment due to the wind load shall not exceed sixty-six and two-thirds (66-2/3) per cent of the moment of stability of the building or other structures due to the dead load only unless the building or other structure is anchored to its foundations so as to resist the excess overturning moment without exceeding the allowable working stresses for the materials used.

1205.9 — STRESSES DURING ERECTION

Provision shall be made for wind stresses during erection of a building or other structure.

SECTION 1206 — SEATING CAPACITY POSTED

Signs stating the maximum seating capacity shall be conspicuously posted by the owner of the building in each assembly room, auditorium or room used for a similar purpose where fixed seats are not installed. It shall be unlawful to remove or deface such notice or to permit more than this legal number of persons within such space.

SECTION 1207 — OCCUPANCY PERMITS FOR CHANGED LOADING

Plans for other than residential buildings filed with the Building Official with applications for permits shall show on each drawing the live loads per square foot of area covered, for which the building is designed, and occupancy permits for buildings hereafter erected shall not be issued until the floor load signs, required by Section 110, have been installed. No changes in the occupancy of a building now existing or hereafter erected shall be made until a revised occupancy permit has been issued by the Building Official certifying that the floors are suitable for the loads characteristic of the proposed occupancy. (See Section 109).

CHAPTER XIII

FOUNDATIONS

EXCAVATIONS, FOOTINGS AND FOUNDATIONS

SECTION 1301 — EXCAVATIONS

1301.1 — GENERAL

When excavating for buildings or excavations accessory thereto, such excavations shall be properly assured against any danger to life and property. Permanent excavations shall have retaining walls of sufficient strength made of steel, masonry, or reinforced concrete to retain embankments, together with any surcharged loads. Excavations for any purpose shall not extend within one (1) foot of the angle of repose or natural slope of the soil under any footing or foundation, unless such footing or foundation is first properly underpinned or protected against settlement.

1301.2 — SUPPORT OF ADJOINING BUILDINGS AND STRUCTURES

When an excavation extends not more than 10 feet below the established curb grade nearest the point of excavation under consideration, the owner of any adjoining building or structure, the footings or foundations of which are to be underpinned or protected under the requirements of this section, shall be notified in writing by the one causing the excavation to be made. The owner of the adjoining structure or building shall be afforded the necessary license to enter the premises where the excavation is to be made, and at his own expense, shall provide the necessary underpinning or protection.

Notice to the owner of adjoining buildings or structures shall be served at least 10 days before an excavation is commenced, and it shall state the depth and location of the proposed excavation.

When an excavation extends more than 10 feet below the established curb grade nearest the point of excavation under consideration, the one causing the excavation to be made, if given the necessary license to enter the adjoining premises, shall provide at his own expense the underpinning and protection required by that part of the excavation which extends to a depth greater than 10 feet below the established curb grade nearest the point of excavation under consideration, whether or not the existing footings or foundations extend to the depth of 10 feet or more below curb grade; or he may shore and brace the sides of his excavation so as to prevent effectively any soil movement into his excavation. If permanent lateral support is provided, the method used must satisfy requirements of the Building Official. If the necessary license is not afforded the person causing the excavation to be made, it shall be the duty of the owner failing to afford such license to provide the required underpinning or protection, for which purpose he shall be afforded the necessary license to enter the premises where such excavation is to be made.

If there is no established curb grade, the depth of excavation shall be referred to the level of the ground at the point under consideration. If an existing building or structure, the footings or foundations of which are required to be underpinned or protected, is so located that the curb grade or level to which it is properly referred is at a higher level than the level to which the excavation is properly referred, then such part of the required underpinning or protection that is necessary due to the difference in these levels shall be made and maintained at the joint expense of the owner of the buiding or structure and the person causing the excavation to be made. For the purpose of determining such part of the underpinning, or protection that is necessary due to such difference in levels, the level to which a building more than five feet back of the street line is properly referred shall be considered to be the level of the natural ground surface adjoining the building or structure.

A party wall which is in good condition and otherwise suitable for continued use, shall be underpinned or protected as required at the expense of the person causing the excavation to be made.

Where the necessary license has been given to the person making an excavation to enter any adjoining structure for the purpose of underpinning or protecting it, the person receiving such license shall provide for such adjoining structure adequate protection against injury due to the elements resulting from such entry.

Only approved granular materials shall be used for backfill. It shall be properly compacted in order to prevent lateral displacements of the soil of the adjoining property after the removal of the shores or braces.

SECTION 1302 — FOOTINGS AND FOUNDATIONS

1302.1 — GENERAL

Except in the case of temporary structures or secondary buildings not over 1 story in height and not exceeding 400 square feet in area, footings and foundations, unless specifically provided, shall be constructed of grillages of steel, of masonry or of reinforced concrete (one and two family dwellings may not be required to have reinforced concrete footings or grillage of steel) in no case less than 12 inches below grade. Masonry units used in foundation walls and footings shall be laid up in Class A or B mortar. The base areas of all footings and foundations shall be proportioned as specified in Section 1302.3.

1302.2 — BEARING CAPACITY OF SOIL

Footings shall be so designed that the allowable bearing capacity of the soil in pounds per square foot as given below shall not be exceeded unless the particular soil on which the building is to be

placed shows a greater bearing capacity than that specified in this Section, under tests as provided herein.

BEARING CAPACITIES OF VARIOUS SOILS

Foundation-bed	Pounds per sq. ft.
Soft Clay	2,000
Firm Clay	3,000
Wet Sand	4,000
Sand and clay, mixed or in layers	4,000
Fine and dry sand	4,000
Coarse Sand	4,000

Where the bearing capacity of the soil is not definitely known or is in question, the Building Official may require load tests or other adequate proof as to the permissible safe bearing capacity at that particular location. To determine the safe bearing capacity of soil, it shall be tested at such locations and levels as conditions warrant, by loading an area not less than 4 square feet to not less than twice the maximum bearing capacity desired for use. Such double load shall be sustained by the soil for a period of not less than 48 hours with no additional settlement taking place, in order that such desired bearing capacity may be used. Examination of sub-soil conditions shall be made at the expense of the owner, when deemed necessary by the Building Official.

Foundations shall be built upon natural solid ground. Where solid natural ground does not occur at the foundation depth, such foundations shall be extended down to natural solid ground or piles shall be used.

Where footings are supported by soils of widely different bearing capacity, the allowable bearing values of the more yielding soil shall be reduced or special provisions shall be made in the design to prevent serious differential settlements.

When it is definitely known the top or sub-soils are of a shifting or moving character, all footings shall be carried to a sufficient depth to insure stability. The excavation around piers shall be back filled with soils or materials which are not subject to such expansion or contraction.

1302.3 — FOOTING DESIGN

The base area of the footings of all buildings shall be designed in the following manner: The area of the footing which has the largest percentage of live load to total load shall be determined by dividing the total load by the allowable soil load. From the area thus obtained the dead load soil pressure of such footing is determined and the areas of all other footings of the building shall be determined on the basis of their respective dead loads only and such dead load soil pressure. In no case shall the load per square foot under any portion of any footing, due to the combined dead, live, wind and/or

any other loads, exceed the safe sustaining power of the soil upon which the footing rests. The total reduced live load occuring in the column immediately above the footing shall be the live load used in the above computation.

Footings shall be proportioned to sustain the applied loads and induced reactions without exceeding the allowable stresses specified in this code.

Concrete in footings shall have an ultimate compressive strength of not less than 2,000 pounds per square inch at 28 days.

1302.4 — DOWELS

Dowels of the same number as the vertical bars in the column, but not less than four, shall extend into the column a distance of not less than 24 diameters for dowels of intermediate grade steel, and 30 diameters for dowels of hard grade steel, except that for plain bars (not deformed bars) the minimum amount of lap shall be 25 per cent greater. Dowels shall extend down into the supporting pedestal or footing the distance required to transfer the full working value of the dowel to the concrete without exceeding the bond stress and to support all vertical loads without exceeding the units stresses permitted in Section 1603.4.

The thickness of concrete above the reinforcement shall be not less than 8 inches for footings bearing on soil, nor less than 12 inches for footings on piles. The thickness of concrete protecting the steel reinforcement shall in no case be less than 3 inches.

Design of footings shall be in accordance with Section 1601.1.

1302.5 — FOUNDATION WALLS

(a) Foundation walls shall be not less in thickness than the walls immediately above them and not less than 12 inches for unit masonry walls, or 8 inches for cast-in-place concrete walls; except that solid masonry walls extending not more than 5 feet, and hollow walls of masonry or walls of hollow units extending not more than 4 feet below the adjacent finished ground level may be 8 inches in thickness. These depths may be increased to a maximum of 7 feet with the approval of the Building Official when he is satisfied that soil conditions warrant such an increase. The total height of 8 inch foundation wall and wall supported shall not exceed that permitted by this code for 8 inch walls. In all cases, however, foundation walls shall have sufficient strength and thickness to resist all lateral pressures permitted by this code.

(b) Foundation walls of 8 inch thickness (except as provided for in section 1302.5. (c) and conforming to the provisions of Section 1302.5 (a) may be used as foundations for dwellings with walls of brick veneer on frame walls or with 10 inch cavity walls, provided that the dwelling is not more than 1-½ stories in height and the total height of the wall, including the gable, is not more than 20 feet.

Foundation walls of 8 inch thickness supporting brick veneer or cavity walls, shall be corbeled with solid units to provide a bearing the full thickness of the wall above. The total projection shall not exceed 2 inches with individual corbels projecting not more than 1/3 the height of the unit. The top corbel course shall not be higher than the bottom of floor joists and shall be a full header course.

(c) Foundation walls of cast-in-place concrete when supporting one story basementless structures may be 6 inches thick if the total height of the foundation wall and the wall supported is within the allowable height permitted by this code for 6 inch walls.

(d) Foundation wall vents shall be provided as set forth in Chapter XVII, Wood.

SECTION 1303 — PILES

1303.1 — GENERAL REQUIREMENTS

(a) Spacing — The minimum center-to-center spacing of piles not driven to rock, shall be not less than twice the average diameter of a round pile, nor less than twice the diagonal dimension of a rectangular or rolled structural steel pile, nor less than 2 ft.-6 in.

The minimum center-to-center spacing of piles driven to rock shall be not less than the average diameter of a round pile plus one foot, nor less than the diagonal dimension of a rectangular or rolled structural steel pile plus one foot.

A column or pier supported by piles, unless connected to permanent construction which provides adequate lateral support, shall rest on not less than three piles.

In no case shall the spacing of piles be such that the average load on the supporting strata will exceed the safe bearing value of those strata, as determined by test borings or other approved methods.

(b) Allowable Loads — All piles used to support any building or part thereof shall be driven in such a manner as not to impair their strength. The allowable load on piles may be determined by the applicable formulas of this section or by load tests as prescribed in Section 1303.6.

Subject to the limitations prescribed in this section for the various types of piles, the allowable load up to a maximum of forty (40) tons per pile shall be determined by the value of R obtained by one of the following formulas or by tests as provided in Section 1303.6. When the allowable load is determined by one of the following formulas, piles with an average diameter or side of 8 inches or less shall be driven by a hammer which delivers a blow of at least 7,000 foot-pounds; piles with an average diameter or side greater than 8 inches and not more than 18 inches shall be driven by a hammer which delivers a blow of at least 15,000 foot-pounds; and piles with an average diameter or side of more than 18 inches shall be

driven by a hammer which delivers a blow of at least 22,000 foot-pounds. Double-acting hammers shall be operated at full rated speed, pressure, and stroke as shown in the manufacturer's catalog. The minimum hammer blow for piles intended to carry 25 tons or more shall be 15,000 foot-pounds.

For drop hammers: $$R = \frac{2\,W\,H}{s + 1}$$

For single-acting steam hammer: $$R = \frac{2\,W\,H}{s + 0.1}$$

For double-acting steam hammers: $$R = \frac{2\,E}{s + 0.1}$$

In which:

R=Allowable pile load in pounds

W=Weight of striking part of hammer in pounds

H=Effective height of fall in feet

E=Actual energy delivered by the hammer per blow in foot pounds

s=Penetration of pile per blow, inches, determined under conditions required by accepted good practice.

Piles shall be designed as short columns except that where piles extend above permanent ground or where piles below ground level receive negligible lateral support from the surrounding soil, they shall be designed as long columns throughout their unsupported length. Any soil other than water or fluid soil shall be deemed to afford sufficient lateral support to permit the design of any pile in accordance with normally accepted engineering practice and the applicable provisions of this code.

(c) Protection of Piles—To such depths or at such horizons as boring records or site conditions indicate possible deleterious action on pile materials because of soil constituents or water levels, such (pile) materials shall be adequately protected by approved preservatives or impervious encasements which will not be rendered ineffective by driving and which will prevent such deleterious action.

1303.2 — STEEL PILES

(a) Definition—Steel piles may consist of rolled shapes, pipe, or built-up structural shapes.

(b) Splices—Splices in steel piles shall be so made and installed as to resist driving shock and insure good alignment of the spliced parts. For each splice in excess of one, a 5% reduction in allowable load shall be made, unless splices are so made as to develop not less than one-third of the full bending strength of the steel section.

Splices in piles whose lengths exceed forty times the nominal size of the section shall develop at least one-third the full bending strength of the steel section. Piles which have been spliced at the mill, by an approved procedure, to develop full section strength shall be acceptable as the equivalent of unspliced piles.

(c) Concrete-Filled Steel Pipe Piles

Size—Concrete-filled steel pipe piles shall have a minimum nominal outside diameter of 10-¾ inches and a nominal wall thickness of not less than 5/16 of an inch, except that piles having a nominal outside diameter of 14 inches or over, shall have a nominal wall thickness of not less than ⅜ of an inch.

Nothing in this section shall be construed as prohibiting the use of concrete filled steel pipe piles of less wall thickness or size than covered by the provisions of this paragraph (c), when such piles are driven with ends closed, provided the requirements of Sec. 1303.5 are satisfied.

Concrete—The concrete used in concrete filled steel pipe piles shall have an ultimate strength at the end of 28 days of not less than 2,500 pounds per square inch.

Maximum Loads on Concrete-Filled Steel Pipe Piles—The allowable load on concrete-filled steel pipe piles shall be as specified in Section 1303.1 (b) but in no case shall the allowable load exceed 7,500 pounds per square inch on the steel plus 25 per cent of the ultimate 28 day compressive strength of the concrete, provided that where the length of the pile exceeds 40 times the nominal outside diameter, the load on the concrete shall not exceed 16 per cent of its 28 day compressive strength. Furthermore, except where the safe load-carrying capacity is determined in accordance with the provisions of Section 1303.6, Tests of Piles, the allowable load per pile shall not exceed the values specified below:

1. Piles driven open-ended to rock:

10-¾" Outside Diameter Pile	55 tons
12-¾" " " "	70 tons
14" " " "	80 tons
16" " " "	100 tons
18" " " "	120 tons
20" " " "	140 tons
22" " " "	150 tons

The above loads are based on wall thicknesses of ⅜ inch. They shall be reduced by ten per cent when wall thicknesses of 5/16 inch are used. For each increase of 1/16 inch in wall thickness, the above values may be increased by 10 per cent, with a maximum increase of 20 per cent.

2. Piles driven open-ended to cemented hardpan which is not underlaid by a softer stratum:

Not more than the values given above for rock-bearing piles but in no case more than 70 tons.

3. Piles, driven open — or closed-ended, and bearing in gravel, sand, and similar graular material which is not underlaid by a softer stratum:

Load shall be not more than 50 tons.

4. Piles, driven open — or closed-ended, and bearing in other materials:

30 tons if driven 40 ft. or less into the ground; 40 tons if driven more than 40 ft. into the ground.

1303.2 (d) — ROLLED STRUCTURAL STEEL PILES

Size and Shape — Rolled structural steel piles shall be of H-form, with flange projection not exceeding 14 times the minimum thickness of metal in either flange or web, and with total flange width at least 85 per cent of the depth of the section. No section shall have a nominal thickness of metal less than ⅜ inch nor a nominal depth in the direction of the web of less than 8 inches. Rolled structural steel piles 40 feet or less in length shall be unspliced sections, unless special permission be secured from the Building Official for the use of spliced sections, where unforseen field conditions arise.

Maximum Loads on Rolled Structural Steel Piles — The allowable load on rolled structural steel piles shall be as specified in Section 1303.1 (b) but in no case shall the allowable load exceed 8500 pounds per square inch. Furthermore, except where the safe load-carrying capacity is determined in accordance with the provisions of Section 1303.6, Tests of Piles, the allowable load per pile shall not exceed the values specified below:

1. Piles driven to practical refusal to a firm bearing on rock or on cemented hardpan not underlaid by a softer stratum.

Size of Pile (Nominal Depth in Inches)	Allowable Load
8	40 tons
10	45 tons
12	55 tons*
14	70 tons*

*Exception: For steel piles which are driven to practical refusal on bed rock, the maximum allowable load per pile shall be 70 tons for piles of 12" nominal depth and 90 tons for piles of 14" and over nominal depth, provided the unit load does not exceed 6800 pounds per square inch in any pile.

2. Piles bearing in gravel, sand, and similar granular material which is not underlaid by a softer stratum; not more than the values given above for rock-bearing piles, but in no case more than 50 tons.

3. Piles bearing in other materials: not over 30 tons if driven 40 feet or less into the ground; nor more than 40 tons if driven more than 40 feet into the ground.

1303.3 — CONCRETE PILES

Concrete piles shall be of material complying with the requirements for Portland cement, fine aggregate, coarse aggregate and reinforcement as specified in Chapter XVI, and steel as specified in Chapter XV. The maximum allowable working stress on any concrete pile shall not exceed 25 percent of the ultimate 28 day compressive strength of the concrete used in the piles, determined by tests as specified in Chapter XVI.

The maximum allowable load on concrete piles shall be as specified in Section 1303.1 (b), provided that in no case shall the pile load exceed the working unit stresses specified herein multiplied by the average cross-sectional area of the pile, and provided that except where the load capacity is determined by tests in accordance with Section 1303.6, the allowable load shall not exceed 40 tons for precast concrete piles and cast-in-place concrete piles with steel shells which are driven in intimate contact with the soil and left permanently in place. The maximum allowable load on cast-in-place concrete piles without permanent steel shells shall be 25 tons. For precast concrete piles the maximum load in tons shall not exceed 2.2 times the average side dimension in inches.

Concrete piles cast-in-place shall be made in such a manner as to insure the exclusion of any foreign matter and to secure a full-sized shaft. The diameter of tapered or step-tapered piles cast-in-place shall be not less than 8" at the point and shall have an average diameter of not less than 11". The diameter of piles cast-in-place without permanent steel shells shall be not less than 14".

No precast concrete pile shall be driven before the concrete has attained a compressive strength at least 3,000 lbs. per sq. in., but in all cases concrete shall be sufficiently cured to attain the ultimate strength upon which its use is based, before piles are driven. Such piles shall be reinforced to withstand conditions of handling, driving, and loading, and shall be so handled and driven as not to cause injury or overstressing which will affect their durability or strength. Precast concrete piles shall have a diameter of not less than 10 inches.

Pile reinforcement when required shall have a protective covering of not less than 1½" of concrete except that where a pile has a metal casing, reinforcement shall be kept not less than 1 inch clear of such exterior casing. Reinforcing for cast-in-place concrete piles shall be considered necessary only when uplift, unbalanced lateral forces, or unsupported lengths (see Sec. 1303.1 (b) are to be considered.

1303.4 — WOOD PILES

Wood piles shall be of southern pine, red oak, Douglas fir, Norway pine, or other approved wood, containing no evidences of decay. The piles shall be free from short kinks or reverse bends and shall have a uniform taper from butt to tip. A straight line drawn from the center of the butt to the tip shall lie wholly within the body of the pile. The diameter of wood piles at the point shall be not less than 6 inches and at the butt shall be not less than 10 inches for piles 25 feet or less in length, and not less than 12 inches at the butt for the piles more than 25 feet in length. No piles with spiral grain which exceeds one complete turn in 40 feet, shall be used. All wood piles and capping shall be cut off and/or placed below mean low water level or below lowest ground water level, with the exception of piles creosoted in accordance with the requirements of this section.

Piles of southern pine, Norway pine, Douglas fir, or red oak, when pressure treated, by an empty-cell process, with Grade One coal tar creosote to a net final retention of not less than 12 pounds of creosote per cubic foot of wood, may be used as follows: (1) Where the upper portion of the pile is exposed and accessible for inspection, the cut-off may be above ground level or water level; (2) Where the upper part of the pile will not be readily accessible for inspection, the cut-off shall be below the ground level but may be above the ground-water level provided the tops are encased in masonry footings so that no part of the pile will be exposed to the air. The cut-offs of creosoted piles shall be treated with three coats of hot creosote.

The use of other species of wood, consistent with the recommendations of the Forest Products Laboratory, for piles to extend above permanent ground-water level, and the use of other equivalent preservatives materials and methods of treatment, which have been established by tests as sound engineering practice, shall be subject to the written permission of the Building Official.

The tops of all timber piles shall be sawed off clean along horizontal plane.

No creosoted piling shall be used which has been so injured in handling or driving as to penetrate the creosoted shell, except in the case of bolt holes and unavoidable framing including the top cut-off, all of which shall be treated with three coats of hot creosote.

The maximum allowable load on a wood pile shall meet the requirements of Section 1303.1 (b), provided that the load on the right cross-section of the pile at mid-length shall not exceed 800 lbs. per sq. in. on piles of Southern pine, Douglas fir, Cypress, Oak, or any woods of comparable strength, or 600 lbs. per sq. in. on piles of Cedar, Norway pine, Spruce, or any woods of comparable strength. The maximum allowable load on a pile having a 6 inch point shall not exceed 20 tons, and on a pile having a point of 8 inches or larger shall not exceed 25 tons.

1303.5 — SPECIAL TYPES OF PILES

The use of types of piles not specifically mentioned herein, and the use of piles under conditions not specifically covered herein, may be permitted, subject to the approval of the Building Official, upon the submission of acceptable test data, calculations and other information relating to the structural properties and/or load-carrying capacity of such piles. Prior to giving such approval, the Building Official may require any information or demonstrations which he deems necessary for the determination of the adequacy of the design or of the suitability of the method of installation. In no case, however, shall the allowable load exceed the limitations specified in the various subsections of Section 1303.

1303.6 — TEST OF PILES

When greater loads per pile than permitted by Section 1303.1 (b) are desired, or when the design load for any pile foundation is in doubt, control-test piles shall be tested in each area by maintaining constant load under increasing settlements. The resulting allowable load shall be not more than one-half of that test load which produces a permanent net settlement per ton of test load of not more than 0.01", but in no case more than one-half inch. In subsequent driving of the balance of foundation piles, all piles shall be deemed to have a supporting capacity equal to the control-pile, when the rate of penetration of such piles is equal to or less than that of the control pile through a comparable driving distance. At least one test pile shall be driven and test loaded in each area of uniform foundation materials and additional piles shall be driven and test loaded if deemed necessary to establish safe pile loading.

When any doubt exists as to the safe load-carrying capacity of any pile the Building Official may order a loading test to be made on the pile. Subject to the limitations prescribed in the various sub-sections of Section 1303, the allowable pile load shall be determined as prescribed in the foregoing paragraph.

SECTION 1304 — CAISSONS

The footings of any structure may be carried down to a firm foundation by isolated piers of reinforced concrete or by open or pneumatic caissons either with or without enlarged base or bell at the bottom. The safe carrying capacity of such shafts or caissons shall not exceed the allowable unit bearing capacity of the soil multiplied by the area of the base or bell at bottom, provided such bell shall have at least 12 inch thickness of concrete at its edge and the sides shall slope at an angle of not less than 60 degrees with the horizontal unless of approved design properly reinforced. In no case shall such piers be of less than 2 feet minimum horizontal dimension.

CHAPTER XIV

MASONRY (QUALITY AND DESIGN)

SECTION 1401 — GENERAL

All masonry construction shall conform to the provisions of this chapter and other applicable sections of this Code.

In all cases masonry shall be of adequate thickness, strength and proportions to support all superimposed loads within the allowable working stresses prescribed.

All masonry materials are required to meet the specifications as outlined in Section 1402. If the Building Official has reason to doubt the materials meeting the applicable specification he may require tests on the materials.

Masonry units may be re-used when clean, whole and conforming to the other requirements of this chapter, except that the allowable working stresses shall be 50 per cent of that permitted for new masonry units.

The wall thickness and other specified dimensions are nominal dimensions. The actual masonry or wall dimensions may vary from the nominal dimensions by not more than one-half (½) inch.

SECTION 1402 — MATERIALS

1402.1 — BRICK

Brick of clay, shale, sand-lime or concrete shall be of a quality at least equal to that required by ASTM Specifications (C62-58) for clay or shale building brick; (C73-51) for sand-lime brick; or (C55-55) for concrete building brick. When in contact with the ground, such as foundation work, or when used in retaining walls, the brick shall be of at least Grade SW for clay or shale or sand-lime brick, or Grade A for concrete brick. When exposed to the weather above ground the brick shall be of at least Grade MW for clay or shale or sand-lime brick, or Grade A for concrete brick.

1402.2 — STRUCTURAL CLAY TILE

Structural clay tile shall be of a quality at least equal to that required by ASTM "Standard Specifications for Structural Clay Load-Bearing Wall Tile" (C34-57) Grade LB when used for bearing walls or piers or Grade LBX when exposed to the weather or soil, or equal to the "Standard Specifications for Structural Clay Non-Load-Bearing

Tile" (C56-57) when used for interior non-load-bearing purposes, or equal to "Standard Specifications for Structural Clay Floor Tile" (C57-57) when used as a structural unit in combination reinforced floor or roof construction. (Tile meeting ASTM (C34-57) Grade LB may be used in on-grade floors.)

1402.3 — CERAMIC AND SALT GLAZED STRUCTURAL CLAY FACING TILE OR BRICK

All glazed masonry building units shall conform to the applicable requirements for solid or hollow clay masonry units of Sections 1402.2 and 1402.3.

1402.4 — HOLLOW AND SOLID CONCRETE MASONRY UNITS

Hollow concrete masonry units shall be of a quality at least equal to that required by ASTM "Standard Specifications for Hollow Load-Bearing Concrete Masonry Units" (C90-59) or "Standard Specifications for Solid Load-Bearing Concrete Masonry Units" (C145-59) when used for bearing walls or piers or when in contact with the ground or exposed to the weather, or equal to "Standard Specifications for Hollow Non-Load-Bearing Concrete Masonry Units" (C129-59) when used for non-bearing purposes and not exposed to the weather.

Structural concrete filler-block or floor tile when included in strength calculations in ribbed floor construction shall have webs and shells not less than one inch thick and shall develope an average compressive strength on the net area not less than that of the rib concrete.

1402.5 — CAST STONE

Cast stone shall be of a quality at least equal to that required by "Specifications for Cast Stone" (704-44) of the American Concrete Institute.

1402.6 — PLAIN CONCRETE

Cast-in-place concrete construction reinforced only for shrinkage or temperature changes shall be classed as plain concrete. Plain concrete, other than fill, shall conform to the requirements for reinforced concrete (Chapter XVI) and have a minimum ultimate compressive strength at 28 days of 2,000 psi.

1402.7 — NATURAL STONE

Natural stone for masonry shall be sound and free from loose or friable inclusions; and shall meet the strength, fire-resistance, durability, and resistance to impact for the proposed use. The Building Official may require satisfactory written evidence to this effect.

1402.8 — ARCHITECTURAL TERRA COTTA AND CERAMIC VENEER

All architectural terra cotta and ceramic veneer shall have a strong homogenous body and shall conform to the applicable requirements of Section 1402.2 and 1402.3. All units of the anchor type shall have the necessary anchor holes and shall be so formed as to engage properly with the supporting structure. All units of the adhesion type shall have keyed or scored back surfaces.

1402.9 — GYPSUM MASONRY UNITS

Gypsum partition tile or block shall be of a quality at least equal to that required by ASTM "Standard Specifications for Gypsum Partition Tile or Block" (C52-54).

1402.10 — STRUCTURAL GLASS BLOCK UNITS

Structural glass block shall comply with the provisions of Section 1413.

1402.11 — MORTAR AND GROUT MATERIALS, PROPORTIONS AND WORKABILITY

Mortar and its ingredients as delivered to the mason shall be of a quality at least equal to that required by ASTM "Tentative Specifications for Mortar for Unit Masonry" (C270-59T).

Masonry cement shall be of a quality at least equal to that required by ASTM "Masonry Cement" (C-91-59).

The type of mortar delivered to the mason for any specific job shall be as required in 1402.12.

Grout is mortar to which has been added a sufficient quantity of water to provide a pouring consistency.

The volume of agregate in mortar shall be at least (2¼) times but not more than three times the volume of cementitious material.

Gypsum mortar shall be composed of one part of unfibered calcined neat gypsum to not more than three parts sand by weight. Only gypsum mortar shall be used with gypsum tile and block units.

1402.12 — TYPES OF MORTAR REQUIRED

Masonry shall be laid in mortar of the types specified in Tables 1, 2 and 3.

TABLE 1 — TYPES OF MORTAR

Type	Average Compressive Strength 2 inch cubes at 28 days, psi
M	2500
S	1800
N	750
O	350

TABLE 2 — MORTAR PROPORTIONS BY VOLUME*

Mortar Type	Portland Cement	Masonry Cement	Hydrated Lime or Lime Putty	Aggregate Measured in Damp Loose Condition
	Cu. Ft.	Cu. Ft.	Cu. Ft.	Cu. Ft.
M	1	None	¼	Not less than 2¼ and not more than 3 times the sum of the volumes of cement and lime used.
	1	1- Type 2	None	
S			Over ¼ to ½	
	1	None		
	½	1- Type 2	None	
N			Over ½ to 1	
	1	None		
	None	1- Type 2	None	
O		None	Over 1 to 2	
	1	1- Type 1 or Type 2		
	None		None	

* For the purpose of these specifications, the weight of one cubic foot of the respective materials used shall be considered to be as follows:

Portland Cement	94 pounds
Masonry Cement	weight printed on bag
Hydrated Lime	40 pounds
Lime Putty (Quick Lime)	80 pounds
Sand, damp and loose	80 pounds of dry sand

TABLE 3 — TYPES OF MORTAR REQUIRED

Type of Masonry	Types of Mortar Permitted
Foundations: (below grade masonry)	
Footings	M or S
Walls of Solid Units	M, S or N
Walls of Hollow Units	M or S
Hollow Walls	M or S
Masonry Other Than Foundation Masonry	
Piers of Solid Masonry	M, S or N
Piers of Hollow Units	M or S
Walls of Solid Masonry	M, S, N or O
Walls of Hollow Masonry	M, S or N
Hollow Walls and Cavity Walls	
(a) Design Wind Pressure Exceeds 20 psf.	M or S
(b) Design Wind Pressure 20 psf or less.	M, S or N
Glass Block Masonry	M, S or N
Non-Bearing Partition and Fireproofing	M, S, N, O or Gypsum
Gypsum Partition Tile or Block	Gypsum
Fire Brick	Refractory Air Setting Mortar
Masonry Other Than Above	M, S or N

SECTION 1403 — WORKING STRESSES

1403.1 — GENERAL REQUIREMENTS

In determining the stresses in masonry, the effects of all loads and conditions of loading and the influence of all forces affecting the design and strength of the several parts shall be taken into account.

The thickness of masonry walls shall be sufficient at all points to withstand all vertical and horizontal loads as specified in Chapter XII, Minimum Design Loads.

Stresses shall be calculated on actual rather than nominal dimensions.

The maximum allowable stresses in masonry shall not exceed those set out in this section, unless it can be determined by accepted engineering analysis that the design meets all safety requirements; see Article 1403.3.

1403.2 — WORKING STRESSES IN UNREINFORCED MASONRY

Except as permitted in other sections of this Code, the compressive stresses in unreinforced masonry shall not exceed the values given in Table 4.

TABLE 4 — ALLOWABLE COMPRESSIVE STRESSES IN UNIT MASONRY

Construction; grade of unit	Allowable compressive stresses gross cross-sectional area (except as noted)			
	Type M Mortar	Type S Mortar	Type N Mortar	Type O Mortar
Solid masonry of brick and other solid units of clay or shale; sand-lime or concrete brick:	psi	psi	psi	psi
8,000 plus, psi	400	350	300	200
4,500 to 8,000, psi	250	225	200	150
2,500 to 4,500, psi	175	160	140	110
1,500 to 2,500, psi	125	115	100	75
Grouted[1] solid masonry of brick and other solid units of clay or shale; sand-lime or concrete brick:				
4,500 plus, psi	350	275	200	.....
2,500 to 4,500, psi	275	215	155	.....
1,500 to 2,500, psi	225	175	125	.....
Solid masonry of solid concrete masonry units:				
Grade A	175	160	140	100
Grade B	125	115	100	75
Masonry of hollow units	85	75	70	.....
Piers of hollow units, celluar spaces filled, as in Article 1405.6	105	95	90	.....
Hollow walls (cavity or masonry bonded)[2].				
Solid units:				
Grade A or 2,500, psi plus	140	130	110	.....
Grade B or 1,500 to 2,500, psi	100	90	80	.....
Hollow units	70	60	55	.....
Stone ashlar masonry:				
Granite	800	720	640	500
Limestone or Marble	500	450	400	325
Sandstone or cast stone	400	360	320	250
Rubble stone, coursed, rough or random	140	120	100	80

[1]See Section 1410.

[2]On gross cross-sectional area of wall minus area of cavity between wythes (leaves). The allowable compressive stresses for cavity walls are based upon the assumption that the floor loads bear upon but 1 of the 2 wythes. When hollow walls are loaded concentrically, the allowable stresses may be increased by 25 per cent.

1403.3 — HIGHER WORKING STRESSES

Higher stresses than herein specified may be used, but only if it is clearly established to the satisfaction of the Building Official, by test, or other approved evidence, that material of a higher grade or a superior workmanship than is generally provided in accepted practice will be employed under approved inspection. The use of higher stresses, however, shall not be allowed until a statement, giving the reasons for such permission together with the facts and circumstances on which it is based, has been placed on file and made a part of the official record of the permit.

1403.4 — ALLOWABLE STRESSES IN COMPOSITE WALLS

In composite walls or other structural members composed of different kinds or grades of masonry units or mortars, the maximum stress shall not exceed the allowable stress for the weakest of the units and mortars of which the wall or member is composed.

1403.5 — ALLOWABLE STRESSES IN UNREINFORCED CONCRETE

The allowable stresses shall not exceed 25 per cent for compression and 3 per cent for tension in extreme fiber in flexure of the compressive strength of the concrete. When the ratio of height to thickness of structural members of plain concrete exceeds 10, the percentage for compressive stress shall be reduced proportionately to 18 per cent for a ratio of height to thickness of 20.

SECTION 1404 — WALL THICKNESS

1404.1 — GENERAL

The minimum thickness of all masonry bearing or non-bearing walls shall be sufficient to resist or withstand all vertical or horizontal loads required by this Code and the fire-resistance requirements set out in Chapter X.

1404.2 — THICKNESS OF BEARING WALLS

The minimum thickness of masonry bearing walls shall be at least 12 inches in thickness for the uppermost 35 feet of their height and shall be increased 4 inches in thickness for each successive 35 feet or fraction thereof measured downward from the top of the wall.

Exceptions:

(a) Stiffened Walls: Where solid masonry bearing walls are stiffened at distances not greater than 12 feet apart by masonry cross-walls or by reinforced concrete floors, they may be of 12-inch thickness for the uppermost 70 feet, measured downward from the

top of the wall, and shall be increased 4 inches in thickness for each successive 70 feet or fraction thereof.

(b) **Top-Story Walls:** The top-story bearing wall of a building not exceeding 35 feet in height may be of 8-inch thickness provided it is not over 12 feet in height and the roof construction imparts no lateral thrust to the walls.

(c) **One-Story Walls:** The walls of a one-story single-family dwelling may be not less than 6 inches in thickness, provided the masonry units meet the minimum compressive strength requirement of 2500 psi for the gross area and that the masonry be laid in Type M, S or N mortar as classified in Section 1402.13.

(d) **Walls of Residence Buildings:** In one or two family residence buildings not more than three stories in height, walls other than coursed or rough or random rubble stone walls, may be of 8-inch thickness when not over 35 feet in height. Such walls in one-story residence buildings or private garages may conform to exception (c) above, and the provision of Section 1405.1.

(e) **Penthouses and Roof Structures:** Masonry walls above roof level, 12 feet or less in height, enclosing stairways, machinery rooms, shafts, or penthouses, may be of 8-inch thickness and may be considered as neither increasing the height nor requiring any increase in the thickness of the wall below.

(f) **Walls of Plain Concrete:** Plain concrete walls may be 2 inches less in thickness than required otherwise in this section but not less than 8 inches except that they may be 6 inches in thickness when meeting the provisions of exception (c) above.

(g) **Cavity Walls:** Cavity walls and hollow walls of masonry units shall not exceed 35 feet in height except that 10-inch cavity walls shall not exceed 25 feet in height above the supports of such walls. The facing and backing of cavity walls shall each have a nominal thickness of at least 4 inches and the cavity shall be not less than 2 inches (actual) nor more than 3 inches in width.

(h) **Composite or Faced Walls:** Neither the height of faced (composite) walls nor the distance between lateral supports shall exceed that prescribed for the masonry of either of the types forming the facing or the backing.

(i) **Stone Walls:** Rough or random or coursed rubble stone walls shall be 4 inches thicker than required for solid masonry walls of the same height, but in no case less than 16 inches in thickness.

1404.3 — THICKNESS OF NON-BEARING WALLS

(a) **Exterior Non-Bearing Walls.** Non-bearing exterior masonry walls may be 4 inches less in thickness than required for bearing walls but the thickness shall be not less than 8 inches except where 6-inch walls are specifically permitted.

(b) **Exterior Panel, Apron or Spandrel Walls.** Panel, apron or spandrel walls that do not exceed 13 feet in height above their support shall not be limited in thickness, provided they meet the fire-resistive requirements of Chapter X and are so anchored to the

structural frame as to insure adequate lateral support and resistance to wind or other lateral forces.

SECTION 1405 — LATERAL SUPPORT

1405.1 — EXTERIOR WALLS

Exterior masonry walls, whether they be bearing or non-bearing shall be supported either horizontally or vertically (whichever distance is the lesser) at right angles to the face of the wall at intervals not exceeding those shown in Table 5 except that an additional 6 feet will be permitted for gables in residential structures and private garages that do not exceed one story in height.

TABLE 5 — LATERAL SUPPORT EXTERIOR WALLS

Type of Masonry	Maximum Ratio of Unsupported Height or Length to Thickness			
Mortar Type	M	S	N	O
Grouted Brick Masonry	22	22	22	
Plain Solid Masonry	20	20	20	16
Hollow Unit Masonry	18	18	18	12
Cavity Walls*	18	18	18	

*In computing the ratio for cavity walls the value for thickness shall be the sum of the nominal thickness of the inner and outer wythes.

1405.2 — BEARING PARTITIONS

Masonry bearing partitions shall be supported either vertically or horizontally (whichever distance is the lesser) at right angles to the face of the wall at intervals not exceeding 24 times the wall thickness for solid masonry units, and 20 times the wall thickness for hollow masonry units when laid in Type M, S or N mortar. Gypsum partition tile or block shall not be used in bearing walls.

1405.3 — NON-BEARING PARTITIONS

Non-bearing partitions shall be supported either vertically or horizontally (whichever distance is the lesser) at right angles to the face of the wall at intervals not exceeding 45 times the nominal wall thickness exclusive of plaster.

Gypsum partition tile shall not be used for partitions to receive portland cement plaster, ceramic tile, marble or structural glass, unless self-furring metal lath is placed over the gypsum tile. Gypsum partition tile or block shall not be used where they will be subjected to continuous dampness.

Only gypsum cement mortar shall be used in the erection of gypsum partition tile or block.

1405.4 — METHOD OF SUPPORT

Lateral support shall be provided by intersecting walls, pilasters, columns, or other vertical members of sufficient strength to provide the required support when the distance is measured horizontally; or by floors, roofs, or other horizontal structural elements which are of sufficient strength to provide the required support when the distance is measured vertically.

Sufficient bonding or anchorage shall be provided between the walls and its supports to resist the assumed wind or other horizontal forces acting either inward or outward. All structural elements relied upon for lateral support shall have sufficient strength and stability to transfer the horizontal force acting in either direction to adjacent structural members or to the ground. When floors or roofs are depended upon for receiving horizontal forces, provisions shall be made in the buildings to transfer the lateral forces to the ground.

When horizontal structural elements of a building (such as floors, roof, spandrel beams) are depended upon for lateral support, vertical bracing of bearing or non-bearing walls shall also be provided at intervals of not more than 75 times the wall thickness. Such vertical bracing may be provided by cross-walls, pilasters, buttresses or other equivalent structural members.

1405.5 — PILASTERS

When relied upon to provide the required lateral support, the width of pilasters shall be not less than one-tenth (1-10) the spaces between such pilasters. All pilasters shall be not less than four (4) inches thicker than the wall supported. In no case shall the distance between such pilasters exceed the lateral support provisions of Table 5.

1405.6 — PIERS

The unsupported height of masonry piers shall not exceed 10 times their least dimension. When structural clay tile or hollow concrete masonry units are used for isolated piers to support beams and girders, the cellular spaces shall be filled solidly with concrete or Type M or S mortar, except that unfilled hollow piers may be used if their unsupported height is not more than 4 times their least dimension. When hollow masonry units are solidly filled with concrete or Type M, S or N mortar, the allowable compressive stress may be increased 25 per cent over that permitted for masonry of hollow units.

SECTION 1406 — PARAPET WALLS

1406.1 — GENERAL

Parapet walls may be of plain solid masonry, hollow masonry units, cavity wall design or reinforced masonry as provided in this section.

All parapet walls shall be properly coped with non-combustible, weatherproof material of a width not less than the thickness of the parapet wall.

Proper flashings shall be installed in such a manner as to prevent moisture entering the wall through the joints in the coping.

There shall be placed in all parapet walls scuppers or relief openings as close as practical to each downspout of not less than 4 to 6 inches in size and spaced not more than 6 inches above the roofline unless the roof is especially designed for water cooling, in which case the scuppers may be raised to provide for retaining the water.

1406.2 — PLAIN MASONRY PARAPET WALLS

Parapet walls of plain solid masonry construction shall be not less than 8 inches in thickness and their height shall not exceed 4 times the nominal wall thickness.

1406.3 — CAVITY WALL PARAPETS

Cavity wall parapets may be used when the facing and backing are constructed of solid masonry units and when they conform to all of the other requirements for cavity walls, except their height shall not exceed 4 times the combined nominal thickness of the facing and backing masonry units.

1406.4 — REINFORCED MASONRY PARAPET WALLS

Unless reinforced to withstand safely wind loads to which they may be subjected, reinforced masonry parapet walls may be considered adequate if they conform to one of the following:

(a) When solid masonry parapet walls are reinforced both horizontally and vertically with not less than ¼-inch rods spaced not more than 2 feet on centers, the height shall be not more than 6 times the nominal wall thickness.

(b) When solid masonry parapet walls are reinforced both horizontally and vertically with a minimum of ¼-inch round rods horizontally on 16-inch centers and ⅜-inch round rods vertically on 24-inch centers, the height shall not exceed 8 times the nominal wall thickness.

SECTION 1407 — BONDING

1407.1 — GENERAL

The facing and backing of masonry walls and partitions shall be bonded in such a manner to provide for common action of the wythes of the material used. Bonding may be accomplished as outlined in Article 1407.2, 1407.3 or 1407.4.

1407.2 — BONDING WITH HEADERS

When the facing and backing are bonded by means of masonry headers, no less than 4 per cent of the wall surface of each face shall be composed of headers extending not less than 4 inches into the backing. The distance between adjacent full length headers shall not exceed 24 inches either vertically or horizontally. In walls in which a single header course does not extend through the wall, bonders from the opposite sides shall lap at least 4 inches, or bonders from opposite sides shall be covered with another bonder course overlapping the bonder below at least 4 inches.

1407.3 — BONDING WITH METAL TIES

The facing and backing of cavity walls shall be bonded with corrosion-resistant 3/16-inch diameter steel rods or metal ties of equivalent stiffness embedded in the horizontal joints. There shall be one metal tie for not more than each 3 square feet of wall area. Ties in alternate courses shall be staggered. Rods bent to rectangular shape shall be used with hollow masonry units laid with the cells vertical; in other walls, the ends of ties shall be bent to 90° angles to provide hooks not less than 2 inches long. Additional bonding ties shall be provided at all openings, spaced not more than 3 feet apart around the perimeter and within 12 inches of the opening.

The facing and backing of solid masonry or hollow masonry walls may be bonded with corrosion-resistant metal ties conforming to the requirements for cavity walls, provided that requirements as to compressive stresses and lateral support conform with those required for cavity walls.

1407.4 — BONDING WITH HOLLOW MASONRY UNITS

When two or more hollow masonry units are used to make up a thickness of a wall, the inner and outer courses may be bonded at vertical intervals not exceeding 34 inches by lapping at least 4 inches over the units below, or by lapping with units at least 50 per cent greater in width than the unit below at vertical intervals not exceeding 17 inches.

1407.5 — ASHLAR, NATURAL OR CAST STONE

(a) **Construction:** In ashlar masonry, bond stones uniformly dis-

tributed shall be provided to the extent of not less than 10 per cent of the area of exposed faces.

Rubble stone masonry 24 inches or less in thickness shall have bond stones with a maximum spacing of 3 feet vertically and 3 feet horizontally and, if the masonry is of greater thickness than 24 inches, shall have one bond stone for each 6 square feet of wall surface on both sides.

(b) **Minimum Thickness:** Stone masonry walls shall in no case have a minimum thickness of less than 16 inches.

SECTION 1408 — ANCHORAGE

1408.1 — GENERAL

All structual elements depending upon one another for continuity or support shall be securely anchored in such a manner as to resist all forces which might tend to separate the structural elements. It is particularly important that adequate anchorage be provided between the roof structure and load-bearing masonry walls to prevent the uplifting and subsequent separation of the roof from the masonry wall as the result of wind pressures.

1408.2 — ROOF ANCHORAGE

Roof structures shall be securely anchored to load-bearing masonry walls. Anchorage shall be considered adequate if provided in one of the following manners or its equivalent:

(a) Anchorage may be provided by ½-inch bolts extending a minimum of 15 inches into the masonry and spaced not more than 6 feet on centers. A steel plate having a minimum surface area of 6 square inches shall be securely attached to the head of the bolt and completely embedded in the masonry.

(b) Where a continuous bond beam at least 8 inches deep and having a minimum continuous reinforcing of 0.2 square inches is provided at the top of the wall anchorage may be provided by one of the following methods:

(1) Welding ½-inch anchor bolts to longitudinal reinforcing.

(2) Hooking tightly around the longitudinal reinforcing through 180°.

With this type of anchorage, bolts need only extend into the wall a minimum of 6 inches.

1408.3 — FLOOR ANCHORAGE

Wood floor joists or beams bearing on masonry walls shall be securely anchored to the walls at intervals not exceeding 6 feet by metal anchors having a minimum cross-section of 0.25 square inch and at least 16 inches long, securely fastened to the joists or beams

at one end of the anchor by means of a single bolt or other approved method, and the other end of the anchor securely built not less than 3-½ inches into the masonry. Where joists run parallel to walls, such anchors shall engage not less than 3 joists, and the joists shall be solidly bridged at the anchor.

Steel floor joists not supporting a concrete slab floor shall be anchored in a manner providing anchorage equivalent to that required for wood floor joists. Concrete slabs bearing on masonry walls shall be considered to provide adequate anchorage without additional anchorage.

1408.4 — ANCHORING INTERSECTING WALLS & PARTITIONS

Masonry walls that meet or intersect shall be adequately bonded or anchored as follows:

(a) Intersecting bearing walls may be bonded either by laying a true bond of at least 50 per cent of the units at the intersection or by using corrosion-resistant metal ties embedded in the bed joints. When metal ties are used for such bonding, they shall be corrosion-resistant 3/16-inch diameter steel rods bent to a rectangular shape and spaced at intervals not exceeding 16 inches vertically. They shall be placed in such a manner as to extend at least 3 inches into each intersecting wall.

(b) Non-bearing partitions, when intersecting walls or partitions, shall be anchored with metal ties or clips at least ⅞ inch wide and not less than 16 gage galvanized iron at intervals of not less than 32 inches vertically.

(c) Brick or tile facing against concrete shall be anchored to the concrete by the use of dovetailed anchors inserted in slots built into the concrete. Anchors shall be at least ⅞ inch wide and not less than 16 gage galvanized iron. They shall be spaced not more than 18 inches vertically and 24 inches horizontally.

(d) Two-inch split furring and 2-inch open back (split) tile (soaps) shall be anchored to the backing with hardware cloth ties consisting of ½ inch mesh, No. 20 gage galvanized iron fabric, at least 4 inches wide and extending at least 3 inches into the masonry and to within ½ inch of the face of the furring, or by other approved ties. Ties shall be spaced not farther apart than 24 inches vertically and 36 inches horizontally.

SECTION 1409 — MISCELLANEOUS DETAILS

1409.1 — CHANGE IN WALL THICKNESS

Except for permissable chases and recesses, walls shall not vary in thickness between their lateral supports. Where cavity walls or walls of hollow masonry units are decreased in thickness, a course of solid masonry not less than 4 inches in thickness shall be interposed

units in the top course of the thicker wall shall be filled solidly with concrete or Type M, S or N mortar.

1409.2 — CHASES

Chases in masonry walls shall not be deeper than ⅓ the wall thickness, nor longer than 4 feet horizontally, except that chases below windows may equal the width of the opening above.

No chase shall be cut or built in an 8-inch wall or within the required area of a pier, except that in buildings of residential occupancy not more than 2 stories in height, chases not more than 4 inches deep may be built in 8 inch walls.

Chases shall not be cut in cavity walls, hollow walls or walls of hollow units but, when permitted, may be built in.

1409.3 — SUPPORTED STRUCTURAL MEMBERS

When combustible structural members frame into walls of thicknesses not greater than 12 inches, they shall project not more than 4 inches into the wall and shall be so spaced that the distance between embedded ends is not less than 4 inches. The space above, below, and between such members shall be filled solidly with burnt-clay materials, mortar, concrete, or equivalent fire-resistive material to a depth of not less than 4 inches on all sides of the members.

Beams, joists, girders or other concentrated loads supported by a wall or pier shall have bearing at least 4 inches in length upon solid masonry or upon a metal bearing plate of adequate design and dimensions to distribute safely the loads on the wall or pier and in no case shall the stresses be greater than allowed in Section 1403.

1409.4 — SUPPORT ON WOOD

No masonry shall be supported on combustible construction, except that prefabricated partitions, weighing not more than 30 pounds per square foot, properly strapped or reinforced and provided with proper nailing devices for attachment may be supported on combustible construction, provided the supporting construction has been designed to carry such loads.

1409.5 — CORBELLING

The maximum horizontal projection of corbelling from the face of the wall from which it projects shall not exceed ½ of the masonry counter-balacing the corbelling. Individual corbells or the maximum projection of one unit shall not exceed ½ the height of the unit nor ⅓ its bed depth. For corbelling of chimneys see Article 802.1 (b).

1409.6 — ARCHES AND LINTELS

The masonry above openings shall be supported by well buttressed arches or lintels of metal or masonry, plain or reinforced,

which shall bear on the wall at each end for not less than 4 inches. In addition, the bearing area shall be sufficient to prevent a concentration of compressive stresses greater than those allowed in Table 4, Section 1403.

1409.7 — PROTECTION AGAINST FREEZING

All masonry shall be protected against freezing for at least 24 hours after laying. No masonry shall be built upon frozen material.

1409.8 — WETTING OF MASONRY UNITS

Brick of clay or shale shall be wetted when laid unless their gain in weight is less than 0.25 ounce per square inch of surface when immersed flatwise in ⅛ inch of water for one minute.

Structural clay tile having absorptions (1-hour boil) of 12 per cent or more shall be wetted before laying.

1409.9 — CONSTRUCTION PRECAUTIONS

Except when carried independently by girders at each floor, no wall shall be built up more than 25 feet in height in advance of other walls of the building. Walls shall be adequately braced during erection. Masonry walls in locations where they may be exposed to high winds during erection shall not be built higher than 10 times their thickness unless adequately braced or until provision is made for the prompt installation of permanent bracing at the floor or roof level immediately above the story under construction. Back fill shall not be placed against foundation walls until they have been braced to withstand the horizontal pressure.

1409.10 — USE OF EXISTING WALLS

An existing masonry wall may be used in the alteration or extension of a building, provided that under the new conditions it meets the requirements of this building code and is structurally sound or can be made so by reasonable repairs.

No existing wall shall be used for the alteration or extension of a building, or increased in height without specific written permission from the Building Official.

SECTION 1410 — PLAIN GROUTED MASONRY

1410.1 — GENERAL

Grouted masonry shall conform to all requirements of Sections 1401 to 1409 inclusive, except as modified by this Section.

Plain grouted masonry is that form of construction made with clay, shale or concrete masonry units in which the interior joints are filled by pouring grout therein as the work progresses.

The masonry units in either the facing or backing, but not necessarily both, at the time of laying, shall absorb in 24 hours of cold immersion an amount of water weighing at least 5 per cent of the dry weight of the unit.

1410.2 — MORTAR AND GROUT

(a) Only Types M, S or N mortar shall be used. Grout shall be Types M, S or N mortars with the addition of sufficient water to give the required pouring consistency without segregation of the constituents of the mortar.

(b) In grout spaces of 2 inches or more in both horizontal dimensions, the grout may contain an addition of pea gravel equal to not more than 2 parts by volume of the cement. Such pea gravel shall be graded with not more than 5 per cent passing the No. 8 sieve and with not less than 95 per cent passing the ⅜-inch sieve.

(c) Brick pieces or chips may be embedded into grout in such spaces, provided each piece or chip is surrounded by not less than ½ inch of grout.

(d) Where the minimum continuous clear openings of a grout space exceeds 6 inches, it may be filled and treated as unreinforced monolithic concrete.

1410.3 — BOND

Where all interior joints are filled with grout, masonry headers shall not be used.

1410.4 — CONSTRUCTION REQUIREMENTS

All masonry units in the 2 outer tiers or wythes shall be laid plumb with full bed and head joints. All interior joints shall be filled with grout. One of the outer tiers may be carried up not more than 8 inches before grouting, but the other face tier shall be carried up not more than 5-½ inches above the grout. Each pour of grout shall be stopped at least 1-½ inches below the top and properly puddled. The longitudinal vertical joints (collar joints) shall be not less than ¾ inch in width.

SECTION 1411 — REINFORCED MASONRY

1411.1 — GENERAL

(a) These regulations cover the use of reinforced masonry in any structure to be erected under the provisions of this Building Code.

Reinforced masonry shall conform to the requirements for Plain Grouted Masonry (see Section 1410), except as modified by this section.

(b) Reinforced masonry is that form of construction made with clay, shale or concrete masonry units in which horizontal and/or vertical reinforcing steel is embedded and in which all of the interior joints are filled by pouring grout therein as the work progresses.

1411.2 — DESIGN

The design of all reinforced masonry structures, including all of their component parts, shall be based on the assumptions, limitations, and methods of stress determination as specified for reinforced concrete in Chapter XVI, except as modified by this section. The designed working stresses in reinforced masonry shall not exceed those given in Table No. 6.

1411.3 — PERMITS AND DRAWINGS

Drawings and typical details of all reinforced masonry construction, showing the size and position of all structural members, steel reinforcement design strength, live loads and lateral forces used in the design, shall be filed with the building department before a permit to construct such work shall be issued. Calculations pertaining to the design shall be submitted, if required by the Building Official.

1411.4 — SPECIAL SYSTEMS OF REINFORCED MASONRY

The sponsors of any system of reinforced masonry, which has been in successful use or the adequacy of which has been shown by test and the design of which is either in conflict with or not covered by the regulations of this Code, shall have the right to present the data on which their design is based to the Board of Adjustments and Appeals as set forth in Section 112 — Appeals.

1411.5 — MORTAR AND GROUT

Mortar and grout for reinforced masonry shall consist of portland cement, hydrated lime or lime putty and aggregate and shall conform to the requirements for Type M or S mortar described in Sections 1402.12 and 1402.13.

1411.6 — REINFORCEMENT

The width or thickness of any space containing reinforcement shall be at least ½ inch greater than the size of any bar or the sum of the sizes of bars which cross, except that ¼-inch bars may be used in ½-inch bed joints.

Reinforced masonry walls shall be reinforced with an area of steel not less than 0.002 times the cross-sectional area of the wall,

not more than ⅔ of which may be used in either direction. The maximum spacing of vertical reinforcement shall be 36 inches.

Vertical reinforcement which supports horizontal reinforcement shall be not less than ⅜-inch in diameter.

1411.7 — ALLOWABLE WORKING STRESSES IN REINFORCED MASONRY

The allowable working stresses in reinforced masonry shall not exceed the values shown in Table 6.

TABLE 6 — ALLOWABLE STRESSES IN REINFORCED MASONRY

Types of Stress	Allowable stress, psi for any strength of $f'm$*	
fm Compression—axial	**	
fm Compression—flexural	0.33 $f'm$	
vm Shear—no web reinforcement	50 psi	
v Shear—with web reinforcement	150 psi	
fm Bearing	0.25 $f'm$	
Em Modulus of elasticity	1000 $f'm$	
Ev Modulus of rigidity in shear	400 $f'm$	
	Mortar or Grout	
	M	S
Bond	psi	psi
u Plain bars	80	60
u Deformed bars (ASTM A305-56T)	160	120

*$f'm$ equals the compressive strength of the masonry as determined by test. When the strength of solid masonry is not determined by test, and the units, mortar and workmanship conform to all applicable requirements of these regulations, the allowable stress may be based on an assumed value, $f'm$, not exceeding 60 per cent of the compressive strength of the units (psi) when Type M mortar and grout are used and not exceeding 45 per cent of the compressive strength of the units, when Type S mortar and grout are used, but such assumed value of $f'm$ shall not exceed 2,000 psi nor 1,500 psi respectively. Masonry units shall be tested in accordance with Standard methods as prescribed in the ASTM Specifications for the units.

Notation

Ag = The overall or gross area of a reinforced masonry column; the total area of the masonry incasement of combination columns.

As = Effective cross-sectional area of reinforcement in compression in columns.

d = The least lateral dimension of a column.

e = Eccentricity of the resultant load on a column measured from the gravity axes.

TABLE 6 — ALLOWABLE STRESSES IN REINFORCED MASONRY (Continued)

$f'm$ = Compressive strength of masonry at 28 days, unless otherwise specified.
fs = Nominal allowable stress in vertical column reinforcement.
h = Unsupported length of column or wall.
Pv = Ratio of volume of lateral reinforcement to the volume of the masonry core (out to out of ties).
Pg = Ratio of the effective cross-sectional area of vertical reinforcement to the gross area Ag.
P = Total allowable axial load on a column, h/d 10 or less.
P' = Total allowable axial load on a column, h/d greater than 10.
t = Overall depth of column section.

**Permissible Load on Columns:

1. The maximum axial load on columns having the ratio Pv more than .006 shall be computed by the following formula:
$$P = Ag\ (0.20\ f'm + 0.65\ Pgfs)$$
2. The maximum axial load on columns having the ratio Pv .006 or less shall be 80 per cent of that computed by the above formula.
3. The maximum load P' on axially loaded columns, having an unsupported length h greater than ten times the least lateral dimension d, shall not exceed:
$$P' = P\ (1.3 - \frac{0.03h}{d})$$

Reinforced Masonry Walls:

The allowable axial stress in reinforced masonry bearing walls with minimum reinforcement as required by Section 1411.6 shall not exceed $.20f'm$. When the reinforcement in bearing walls is designed, placed and anchored in position as for columns, the allowable stresses shall be on the same basis as for columns.

1411.8 — ALLOWABLE STRESS IN REINFORCEMENT

Allowable stresses in reinforcement shall be in accordance with Section 1603.4.

SECTION 1412 — REINFORCED GYPSUM CONCRETE

1412.1 — GENERAL

Reinforced Poured Gypsum Concrete shall conform to the requirements of ASTM Standard Specifications for Gypsum Concrete, C317-55.

The design and application of reinforced gypsum concrete shall be in accordance with the requirements of ASA Standard A 59.1

dated December 29, 1954, American Standards Association Specifications for Reinforced Gypsum Concrete.

A competent inspector, satisfactory to the Building Official, shall be present on the work at all times when cast-in-place gypsum concrete is being mixed or deposited.

SECTION 1413 — STRUCTURAL GLASS BLOCK

1413.1—WHERE PERMITTED

Masonry of glass blocks may be used in non-load-bearing exterior or interior walls and in openings which might otherwise be filled with windows, either isolated or in continuous bands, provided the glass block panels have a thickness of not less than 3½ inches at the mortar joint and the mortared surfaces of the blocks are satisfactorily treated for motar bonding.

1413.2—SIZE OF PANELS

Glass block panels for exterior walls shall not exceed 144 square feet of unsupported wall surface nor 25 feet in length nor 20 feet in height between supports. For interior walls, glass block panels shall not exceed 250 square feet of unsupported area nor 25 feet in one direction between supports.

1413.3—REINFORCEMENT OF EXTERIOR PANELS

(a) **Anchorage:** Exterior glass block panels shall be held in place in the wall opening to resist both external and internal pressures due to wind. Panels shall be set in recesses at the jambs and, for panels exceeding 10 feet in horizontal dimension between supports, at the head as well, so as to provide a bearing surface at least one inch wide along the panel edges; except that when approved by the Building Official for panels exceeding neither 100 square feet in area nor 10 feet in either horizontal or vertical dimension, and situated 4 stories or less, anchorage may be provided by means of non-corrodible perforated metal strips.

(b) **Placing Reinforcement;** Glass block panels shall have reinforcement in the horizontal mortar joints, extending from end to end of mortar joints, but not across expansion joints, with any unavoidable joints spliced by lapping the reinforcement not less than 6 inches. The reinforcement shall be spaced not more than 2 feet apart vertically. In addition reinforcements shall be placed in the joint immediately below and above any openings within a panel. The reinforcement shall consist of 2 parallel, longitudinal, galvanized steel wires, No. 9 gage or larger, spaced 2 inches apart, and having welded thereto No. 14 or heavier gage cross wires at intervals not exceeding 8 inches, or the equivalent approved by the Building Official.

1413.4—MORTAR

Glass block shall be laid in Type M, S or N mortar. Both vertical and horizontal mortar joints shall be at least ¼ inch and not more than ⅜ inch thick and shall be completely filled.

1413.5—EXPANSION JOINTS

Every exterior glass block panel shall be provided with expansion joints at the sides and top. Expansion joints shall be entirely free of mortar, and shall be filled with resilient material.

SECTION 1414 — VENEERED WALLS

1414.1—GENERAL

(a) Veneer as used in this section refers to a facing of brick, tile, concrete masonry units, metal, including metal coated with porcelain enamel, glass or similar material securely attached to a wall for the purpose of providing ornamentation, protection, or insulation but not so bonded as to exert a common reaction under load.

(b) Veneer shall not be assumed as supporting any load other than its own weight, neither shall it be assumed to add to the strength of the wall.

(c) Exterior veneer shall not be attached to wood at any point more than 20 feet above the adjacent ground elevation.

1414.2—VENEER OF STRUCTURAL MASONRY UNITS

Veneer of structural masonry units shall apply to all veneer composed of units meeting the physical requirements of this Chapter, set in mortar and not less than 1⅝ inches in actual thickness for solid masonry units, and not less than 3 inches in actual thickness for hollow masonry units.

1414.3—SUPPORT OF VENEER OF MASONRY UNITS

The weight of all masonry veneer 1⅝ inches or greater in actual thickness shall be supported upon footings, foundation walls or other approved non-combustible structural supports.

1414.4—ANCHORAGE OF VENEER OF MASONRY UNITS

All masonry veneer 1⅝ inches or greater in actual thickness shall be attached to the supporting wall either by headers as provided in Section 1407.2, or with corrosion-resistant metal ties or other approved methods.

Veneer ties, if of strand wire, shall be not less than No. 6 W. & M. gage wire with the end of the wire bent to a 90-degree angle to form a hook not less than 2 inches long embedded in the mortar joint.

Veneer ties, if of corrugated sheet metal, shall be not less than 22 U. S. gage. Each metal tie shall support not more than 3 square feet of wall area and shall not be spaced farther apart than 24 inches horizontally.

1414.5—HEIGHT OF VENEER OF MASONRY UNITS

Masonry veneer 1⅝ inches or greater in thickness shall not be attached to wood framing at any point more than 20 feet above the foundation, except in gables. Such veneer attached to masonry walls shall not exceed 35 feet in height above approved supports.

1414.6—VENEER OF NON-STRUCTURAL UNITS

Veneer of non-structural units shall apply to all veneer less than 1⅝ inches in thickness and the units shall not be assumed to support any superimposed loads.

1414.7—ANCHORAGE GENERAL

Non-structural materials used as veneer shall be anchored to the supporting wall by corrosion-resistant metal ties not less in thickness than No. 9 W & M. gage wire, and spaced not more than 12 inches apart both horizontally and vertically or by other approved devices or methods. Such attachments and their supports shall be capable of resisting a horizontal force equal to the wind loads specified in this Code, but in no case less than 20 pounds per square foot.

1414.8 — ADHESION TYPE ANCHORAGE

(a) **Material:** Approved units or units less than 1⅝ inches in thickness of flat tile, stone or adhesion type architectural terra cotta manufactured with keyed or scored back surface may be cemented to a masonry or concrete wall or to exterior portland cement mortar on high rib metal lath with a Type M or S mortar provided the mortar bond is sufficient to withstand a shearing stress of 50 pounds per square inch after curing for 28 days. No individual unit so attached shall exceed 30 inches in any one dimension and shall not have more than 540 square inches of superficial face area.

(b) **Installation:** Just before setting, each piece shall be soaked in clean water for one hour or more and the surface of the backing wall shall be saturated with water applied through a hose nozzle at a pressure of at least 25 pounds per square inch. A brush coat of neat portland cement and water shall then be applied both to the backing and the back side of the veneer. The mortar shall average ¾ inch in thickness. One-half of the mortar (⅜ inch) shall be applied to the veneer unit and half to backing just prior to setting. Pieces disturbed after having been tapped into place shall be removed immediately, after which additional mortar shall be applied as required above and the piece reset.

1414.9 — METAL VENEER — REQUIREMENTS

(a) **Material:** Metal veneers that are exposed to the weather shall be of corrosion-resistant metal, or metal covered front and back with porcelain enamel or given other approved treatment or coating to render them corrosion-resistant.

(b) **Attachment:** Exterior metal veneer shall be securely attached to the supporting masonry or framing members with corrosion-resistant fastenings, metal ties or by other approved devices or methods. The spacing of the fastenings or ties shall not exceed 24 inches either vertically or horizontally, except where wider spacing is deemed adequate and specifically approved by the Building Official; but where units exceed 4 square feet in area there shall be not less than four attachments per unit. The metal attachments shall have a cross-sectional area not less than provided by No. 9 W. & M. gage wire (0.0173 square inch). Such attachments and their supports shall be capable of resisting a horizontal force equal to the wind loads specified in this Code, but in no case less than 20 pounds per square foot.

(c) **Supports:** Metal supports for exterior metal veneer shall be protected by painting, galvanizing, or by other approved equivalent coating or treatment. Wood studs, furring strips, or other wood supports for exterior metal veneer shall be pressure-treated with an approved preservative or otherwise protected against decay in an approved manner.

(d) **Protection:** All joints and edges in metal veneer that are exposed to the weather shall be caulked or painted with approved durable waterproofing material, or shall be protected by other approved means to prevent penetration of moisture.

No masonry backup shall be required for metal veneer except as is necessary to meet the fire-resistance requirements of this Code.

1414.10 — GLASS VENEER — REQUIREMENTS

(a) **Area:** The area of a single section of thin exterior structural glass veneer shall not exceed 10 square feet where not more than 15 feet above the level of the sidewalk or grade level directly below, and shall not exceed 6 square feet where more than 15 feet above that level.

(b) **Length or Height:** The length or height of any section of thin exterior structural glass veneer shall not exceed 48 inches.

(c) **Thickness:** The thickness of thin exterior structural glass veneer shall be not less than 11/32 inch.

1414.11 — ATTACHMENT

Thin exterior structural glass veneer shall be set only after backing is thoroughly dry and after application of an approved bond coat applied uniformly over the entire surface of the backing so as to effectively seal the surface. Glass shall be set in place with an

approved mastic cement in sufficient quantity so that at least 50 per cent of the area of each glass unit is directly bonded to the backing by mastic not less than ¼ inch thick and not more than ⅝ inch thick. Bond coat and mastic shall preferably be from the same manufacturer and shall bond firmly together.

1414.12 — GLASS AT SIDEWALK LINE

Where glass extends to sidewalk surface, each section shall rest in an approved metal moulding, and set at least ¼ inch above the highest point of the sidewalk. The space between the moulding and the sidewalk shall be thoroughly caulked and made watertight.

1414.13 — JOINTS

(a) **Abutting Edges:** Unless otherwise specifically approved by the Building Official, all abutting edges of thin exterior structural glass veneer shall be ground square. Mitered joints shall not be used except when specifically approved for wide angles.

(b) **Treatment of Joints:** All joints shall be uniformly buttered with an approved jointing compound and all horizontal joints shall be held to not less than 1/16 inch by an approved non-rigid substance or device.

(c) **Expansion Joints:** Where thin exterior structural glass veneer abuts non-resilient material at sides or top, expansion joints not less than ¼ inch wide shall be provided.

1414.14 — SHELF ANGLES

When thin exterior structural glass veneer is installed above the level of the top of a bulkhead facing, or at a level more than 36 inches above the sidewalk level, the mastic cement binding shall be supplemented with approved non-ferrous metal shelf angles located in the horizontal joints in every course. Such shelf angles shall be of not less than 18 U.S. gage and not less than 2 inches in length, and shall be spaced at approved intervals, with not less than 2 angles for each glass unit. Shelf angles shall be secured to the wall or backing with expansion bolts, toggle bolts, or by other approved methods.

1414.15 — MECHANICAL FASTENINGS

(a) **Where Required:** All thin exterior structural glass veneer installed above the level of the heads of show windows and all such veneer installed more than 12 feet above sidewalk level, shall, in addition to the mastic cement and shelf angles, be held in place by the use of approved fastenings at each vertical or horizontal edge, or at the 4 corners of each glass unit.

(b) **Attachment to Backing:** Fastenings shall be secured to the wall or backing with expansion bolts, toggle bolts, or by other approved method.

(c) **Type and Design:** Fastenings shall be of approved type and be so designed as to hold the glass veneer in a vertical plane independently of the mastic cement. Shelf angles providing both support and fastenings may be used.

1414.16 — FLASHING

Exposed edges of thin exterior structural glass veneer shall be flashed with over-lapping corrosion-resistant metal flashing and caulked with a waterproof compound in an approved manner to effectively prevent the entrance of moisture between the glass veneer and the backing.

CHAPTER XV — STEEL

STRUCTURAL STEEL

(Riveted, Bolted or Welded Construction)

SECTION 1501 — GENERAL

1501.1 — SCOPE

The requirements of Sections 1501 to 1510 of this chapter shall govern the design, fabrication, and erection of structural steel for buildings and other structures except that the requirements do not apply to steel joists, members formed of flat-rolled sheet or strip, light-gage steel construction, skylights, marquees (except structural frame), fire escapes, or other miscellaneous light steel construction. (See Section 1511).

1501.2 — GENERAL

Except as otherwise specifically provided in this Code, or in rules duly promulgated by the Building Officials, the Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, revised June, 1949, and the Supplementary Rules for Plastic Design and Fabrication, December 4, 1958, as adopted and published by the American Institute of Steel Construction, shall be accepted as good practice in structural steel construction.

Where plastic design is used as the basis for proportioning continuous beams and structural frames, the provisions relating to allowable working stress contained in Sections 1503 and 1507 of this Code are waived. Except as modified by the Supplementary Rules and the provisions herein, all other pertinent provisions of this Code shall govern.

1501.3 — WELDING

Details of welding technique, inspection of welding, and qualifications of welding operators shall conform to the recommendations of the Standard Code for Arc and Gas Welding in Building Construction (April 15, 1946) of the American Welding Society.

SECTION 1502 — MATERIALS

1502.1 — STRUCTURAL STEEL

Structural steel shall conform to the Tentative Specifications of the American Society for Testing Materials for Steel for Bridges and Buildings, Serial Designation A7-58T and A36-60T).

1502.2 — RIVET STEEL

Rivet steel shall conform to the Standard Specifications of the American Society for Testing Materials for Structural Rivet Steel, Serial Designation A141-58.

1502.3 — FILLER METAL

All arc-welding electrodes shall conform to the requirements of the American Welding Society Specifications for Iron and Steel Arc-Welding Electrodes, (1958 Edition). Electrodes shall be of classifications Numbers E6010, E6011, E6012, E6013, E6020 or E6030 and shall be suitable for the positions and other conditions of intended use.

With each container of electrodes the manufacturer shall furnish instructions giving recommended voltage and amperage (and polarity if direct current) for all uses and welding positions for which the electrode is suitable.

1502.4 — STOCK MATERIAL

(a) Stock material shall be of a quality equal to that required by Section 1502.1. Mill test reports shall constitute sufficient record as to the quality of material carried in stock.

(b) Unidentified stock material, if free from surface imperfections, may be used for short sections of minor importance, or for small unimportant details, where the precise physical properties of the material would not affect the safety of the structure.

SECTION 1503 — ALLOWABLE UNIT STRESSES

1503.1 — GENERAL

Except as provided herein under "Bending," all parts of the structure shall be so proportioned that the unit stress in pounds per square inch shall not exceed the following values:

1503.2 — STRUCTURAL STEEL, RIVETS, BOLTS AND WELD METAL

(1) TENSION

Structural Steel, net section	20,000
Butt welds, section through throat	20,000
Rivets, on area based on nominal diameter	20,000
Bolts and other threaded parts, on nominal area at root of thread	20,000

(2) COMPRESSION

Columns, gross section

For axially loaded columns with values of l/r not greater than 120 ..... 17,000-0.485 l^2/r^2

For axially loaded columns with values of l/r greater than 120 ..... $\dfrac{18{,}000}{1 + \dfrac{l^2}{18{,}000r^2}}$

in which l is the unbraced length of the column, and r is the corresponding radius of gyration of the section, both in inches.

Plate Girder Stiffeners, gross section 20,000
Webs of Rolled Sections at toe of fillet (crippling) 24,000
Butt-Weld, section through throat (crushing) 20,000

(3) BENDING

Tension on extreme fibers of rolled sections, plate girders, and built-up members, (See Section 1508.1) 20,000

Compression on extreme fibers of rolled sections, plate girders, and built-up members,

With $\dfrac{ld}{bt}$ not in excess of 600 20,000

With $\dfrac{ld}{bt}$ in excess of 600 ..... $\dfrac{12{,}000{,}000}{\dfrac{ld}{bt}}$

in which l is the unsupported length and d the depth, of the member; b is the width, and t the thickness, of its compression flange; all in inches; except that l shall be taken as twice the length of the compression flange of a cantilever beam not fully stayed at its outer end against translation or rotation.

Exception:

Fully continuous beams and girders may be proportioned for negative moments which are maximum at interior points of support, at a unit bending stress 20 percent higher than above stated; provided that the section modulus used over supports shall not be less than that required for the maximum positive moments in the same beam or girder, and provided that the compression flange shall be regarded as unsupported from the support to the point of contra-flexure.

Stress on extreme fibers of pins 30,000

Fiber stresses in butt welds, due to bending, shall not exceed the values prescribed for tension in compression, respectively.

For columns proportioned for combined axial and bending stresses, the maximum unit bending stress Fb, Sect. 1503.4 may be taken at 24,000 pounds per square inch, when this stress is induced by the gravity (vertical) loading of

fully or partially restrained beams framing into the columns.

(4) SHEARING

Rivets	15,000
Pins, and turned bolts in reamed or drilled holes	15,000
Unfinished bolts	10,000
Webs of beams and plate girders, gross section	13,000
Weld Metal	
on section through throat of fillet weld, or on faying surface area of plug or slot weld	13,600
on section through throat of butt weld	13,000

(Stress in a fillet weld shall be considered as shear on the throat, for any direction of applied stress. Neither plug nor slot welds shall be assigned any values in resistance to stresses other than shear.)

(5) BEARING

	Double Shear	Single Shear
Rivets	40,000	32,000
Turned bolts in reamed or drilled holes	40,000	32,000
Unfinished bolts	25,000	20,000
Pins	32,000	
Contact Area		
Milled Stiffeners and Other Milled Surfaces	30,000	
Fitted Stiffeners	27,000	
Expansion rollers and rockers (pounds per linear inch)	600d	

in which d is diameter of roller or rocker in inches.

1503.3 — CAST STEEL

Compression and Bearing, same unit stresses as specified for Structural Steel. Other Unit Stresses, 75 percent of those specified for Structural Steel.

1503.4 — COMBINED AXIAL AND BENDING STRESSES

Members subject to both axial and bending stresses shall be so proportioned that the quantity.

$$\frac{fa}{Fa} + \frac{fb}{Fb}$$ shall not exceed unity, in which

Fa = axial unit stress that would be permitted by this Specification if axial stress only existed.

Fb = bending unit stress that would be permitted by this Specification if bending stress only existed.

fa = axial unit stress (actual) = axial stress divided by area of members.

fb = bending unit stress (actual) = bending moment divided by section modulus of member.

1503.5 — WIND ONLY

Members subject only to stresses produced by wind forces may be proportioned for unit stresses 33⅓ percent greater than those specified for dead and live load stresses. A corresponding increase may be applied to the allowable unit stresses in their connecting rivets, bolts or welds.

1503.6 — WIND AND OTHER FORCES

Members subject to stresses produced by a combination of wind and other loads may be proportioned for unit stresses 33⅓ percent greater than those specified for dead and live load stresses, provided the section thus required is not less than that required for the combination of dead load, live load, and impact (if any). A corresponding increase may be applied to the allowable unit stresses in their connecting rivets, bolts or welds.

SECTION 1504 — SLENDERNESS RATIO

(a) The ratio of unbraced length to least radius of gyration, l/r for compression members and for tension members other than rods shall not exceed:

For main compression members 120
For bracing and other secondary members in compression 200
For main tension members 240
For bracing and other secondary members in tension.....300

(b) The slenderness of a main compression member may exceed 120, but not 200; provided that it is not ordinarily subject to shock or vibratory loads and provided that its unit stress under full design loading shall not exceed the following fraction of that stipulated under Section 1503.2 (2), for its actual ratio l/r:

$$\left(1.6 - \frac{l}{200r}\right)$$

SECTION 1505 — MINIMUM THICKNESS OF MATERIAL

1505.1 — GENERAL

The following stipulations (1) and (2) as to minimum thickness shall apply to exterior steelwork enclosed in a non-impervious envelope or exposed to frequent rain or snow, and to interior steelwork subject to atmospheric exposure more corrosive than indoor atmosphere controlled for human comfort.

(1) Columns, studs, lintels, girders and beams; exterior trusses, exterior bracing members; one-fourth inch minimum.

(2) Purlins, girts, trusses and bracing members sheltered from

direct exposure to rain and snow; three-sixteenths inch minimum.

The controlling thickness of rolled shapes, for the purposes of stipulations (1) and (2), shall be taken as the mean thickness of their flanges, regardless of web thickness.

Steelwork exposed to industrial fumes or vapor shall be given special protection as required in the judgment of the Engineer.

SECTION 1506 — CONNECTIONS

1506.1 — CONNECTIONS OF TENSION AND COMPRESSION MEMBERS IN TRUSSES

The connections at ends of tension or compression members in trusses shall develop the strength required by the total stresses; but in no case shall such strength developed be less than 50 percent of the effective strength of the material connected.

1506.2 — MILLED JOINTS IN COMPRESSION MEMBERS

Where compression members are in full-milled bearing or base plates, and where full-milled tier-building columns are spliced, there shall be sufficient rivets, bolts or welds to hold all parts securely in place.

Where other compression members are spliced by full-milled bearing, the splice material and its riveting or welding shall be arranged to hold all parts in line and shall be proportioned for 50 percent of the computed stress.

All the foregoing joints shall be proportioned to resist any tension that would be developed by specified wind forces acting in conjunction with 75 percent of the calculated dead load stress and no live load, if this condition will produce more tension than with full dead load and live load applied.

1506.3 — RIVETS AND BOLTS IN COMBINATION WITH WELDS

In new work, rivets or bolts in combination with welds shall not be considered as sharing the stress, and welds shall be provided to carry the entire stress for which the connection is designed.

In making welded alterations to structures, existing rivets may be utilized for carrying stresses resulting from existing dead loads, and the welding need be adequate only to carry all additional stress.

1506.4 — TURNED BOLTS

Turned bolts in close-fitting holes as specified in Section 1509.3 may be used in shop or field work where it is impracticable to drive satisfactory rivets. The finished shank shall be long enough to provide full bearing, and washers shall be used under the nuts to give full grip when the nuts are turned tight.

The term "turned bolt" embraces all bolts regardless of the manufacturing process, which have a tolerance on the nominal diameter of 0 over, .006 inch under, and which have regular semi-finished heads conforming to American Standard B18-2 of the American Institute of Bolt, Nut and Rivet Manufacturers.

1506.5 — HIGH STRENGTH STEEL BOLTS

High Strength Steel Bolts may be used in lieu of rivets of the some nominal diameter provided the connections are designed and constructed in accordance with the Specifications for Assembly of Structural Joints Using High Strength Steel Bolts, ASTM A325, Approved by Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation March, 1960.

SECTION 1507 — COMPOSITE BEAMS

1507.1 — DEFINITION

The term "composite beam" shall apply to any rolled or fabricated steel floor beam entirely encased in a poured concrete haunch at least four inches wider, at its narrowest point, than the flange of the beam, supporting a concrete slab on each side without openings adjacent to the beam; provided that the top of the beam is at least 1½ inches below the top of the slab and at least 2 inches above the bottom the slab; provided that a good grade of stone or gravel concrete with Portland cement, is used; and provided that the concrete haunch has adequate mesh, or other reinforcing steel, throughout its whole depth and across its soffit.

1507.2 — DESIGN ASSUMPTIONS

Composite beams may be figured on the assumption that:

1. The steel beam carries, unassisted, all dead loads prior to the hardening of the concrete, with due regard for any temporary support provided, and

2. The steel and concrete carry by joint action all loads, dead and live, applied after the hardening of the concrete.

1507.3 — UNIT STRESSES

The total tensile unit stress in the extreme fiber of the steel beam thus computed shall not exceed 20,000 pounds per square inch. (Section 1503.2 (1).

The maximum stresses in the concrete and the ratio of Young's moduli, for steel and concrete, shall be as prescribed by the specifications governing the design of reinforced concrete for the structure.

1507.4 — END SHEAR

The web and the end connections of the steel beam shall be designed to carry the total dead and live load, except as this may be reduced by the provision of other proper support.

SECTION 1508 — PLATE GIRDERS AND ROLLED BEAMS

1508.1 — PROPORTIONING

Riveted and welded plate girders, cover-plated beams, and rolled beams shall in general be proportioned by the moment of inertia of the gross section. No deduction shall be made for standard shop or field-rivet holes in either flange; except that in special cases where the reduction of the area of either flange by such rivet holes exceeds 15 percent of the gross flange area, the excess shall be deducted. If such members contain other holes, as for bolts, pins, countersunk rivets, or plug or slot welds, the full deduction for such holes shall be made. The deductions thus applicable to either flange shall be made also for the opposite flange if the corresponding holes are there present.

1508.2 — WEB

Plate girders webs shall have a thickness of not less than 1/170 of the unsupported distance between flanges.

SECTION 1509 — WORKMANSHIP

1509.1 — GENERAL

All workmanship shall be equal to the best practice in modern structural shops.

1509.2 — GAS CUTTING

The use of a cutting torch is permissible if the metal being cut is not carrying substantial stress during the operation. To determine the effective width of members so cut, ⅛ inch shall be deducted from each gas-cut edge.

1509.3 — RIVETED CONSTRUCTION—HOLES

Holes for rivets or unfinished bolts shall be 1/16 inch larger than the nominal diameter of the rivet or bolt. If the thickness of the material is not greater than the nominal diameter of the rivet or bolt plus ⅛ inch, the holes may be punched. If the thickness of the material is greater than the nominal diameter of the rivet or bolt plus ⅛ inch, the holes shall be either drilled from the solid, or sub-punched and reamed. The die for all sub-punched holes, and the drill for all sub-drilled holes, shall be at least 1/16 inch smaller than the nominal diameter of the rivet or bolt.

Drifting to enlarge unfair holes shall not be permitted. Holes that must be enlarged to admit the rivets shall be reamed. Poor matching of holes shall be cause for rejection.

Holes for turned bolts shall be not more than 1/50 inch larger than the external diameter of the bolts. All drilling or reaming for

turned bolts shall be done after the parts to be connected are assembled; except that if such drilling or reaming after assembly is impracticable, it may be done through steel templets with hardened bushings.

1509.4 — RIVETING

Rivets shall be driven by power riveters, of either compression or manually-operated type, employing pneumatic or electric power. After driving they shall be tight and their heads shall be in full contact with the surface.

Rivets shall ordinarily be hot-driven, in which case their finished heads shall be of approximately hemispherical shape and shall be of uniform size throughout the work for the same size rivet, full, neatly finished and concentric with the holes. Hot-driven rivets shall be heated uniformly to a temperature not exceeding 1950° F.; they shall not be driven after their temperature has fallen below 1000° F.

Rivets may be driven cold if approved measures are taken to prevent distortion of the riveted material. The requirements for hot-driven rivets shall apply except as modified in the Tentative Specifications for Cold-Driven Rivets of the American Institute of Bolt, Nut and Rivet Manufacturers.

1509.5 — WELDED CONSTRUCTION — PREPARATION OF MATERIAL

Surfaces to be welded shall be free from loose scale, slag, rust, grease, paint and any other foreign material, except that mill scale which withstands vigorous wire brushing, may remain. A light film of linseed oil may be disregarded. Joint surfaces shall be free from fins and tears. Preparation of edges by gas cutting shall, wherever practicable, be done with a mechanically guided torch.

1509.6 — WELDED CONSTRUCTION — ASSEMBLING

Parts to be fillet welded shall be brought in as close contact as practicable, and in no event shall be separated more than 3/16 inch. If the separation is 1/16 inch or greater, the size of the fillet welds shall be increased by the amount of the separation. The separation between faying surfaces of lap joints shall not exceed 1/16 inch. The fit of joints at contact surfaces which are not completely sealed by welds, shall be close enough to exclude water after painting.

1509.7 — WELDED CONSTRUCTION — TEMPERATURES

No welding shall be done when the temperature of the base metal is lower than 0° F. At temperatures between 32° F., and 0° F., the surface of all areas within three inches of the point where a weld is to be started, shall be heated to a temperature at least warm to the hand before welding is started.

When welds are being made in parts thicker than 1½ inches, the temperature of the base material adjacent to the welding shall be at least 70° F.

1509.8 — WELDING

The technique of welding employed, the appearance and quality of welds made, and the methods used in correcting defective work shall conform to the American Welding Society Code for Arc and Gas Welding in Building Construction, Section 4—Workmanship.

All complete-penetration butt welds, except when produced with the aid of backing material or welded in the flat position from both sides in square-edge material not more than 5/16 inch thick with root opening not less than one-half the thickness of the thinner part joined, shall have the root of the initial layer gouged or chipped out on the back side before welding is started from that side, and shall be so welded as to secure sound metal and complete fusion throughout the entire intended cross section. Butt welds made with the use of a backing of the same material as the base metal shall have the weld metal thoroughly fused with the backing material. Backing strips may be removed by means of gas cutting, after welding is completed, provided no injury is done to the base and weld metal and the weld surface is left flush or slightly convex with full throat thickness.

1509.9 — FINISHING

Compression joints depending upon contact bearing shall have the bearing surfaces machined to a common plane after the members are completed.

1509.10 — TOLERANCES

Finished members shall be true to line and free from twists, bends and open joints.

Compression members may have a lateral variation not greater than 1/1000 of the axial length between points which are to be laterally supported.

A variation of 1/32 inch is permissible in the overall length of members with both ends milled.

Members without milled ends which are to be framed to other steel parts of the structure may have a variation from the detailed length not greater than 1/16 inch for members 30 feet or less in length, and not greater than ⅛ inch for members over 30 feet in length.

SECTION 1510 — ERECTION

1510.1 — BRACING

The frame of steel skeleton buildings shall be carried up true and plumb, and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including equipment, and the operation of same. Such bracing shall be left in place as long as may be required for safety.

1510.2 — FIELD CONNECTIONS

All field connections may be made with unfinished bolts, except as follows:

Rivets or welds shall be used for the following connections; except that turned bolts or high strength steel bolts may be used in lieu of rivets as provided in Sections 1506.4 and 1506.5.

Column splices in all tier structures 200 feet or more in height.

Column splices in tier structures 100 to 200 feet in height, if the least horizontal dimension is less than 40 percent of the height.

Column splices in tier structures less than 100 feet in height, if the least horizontal dimension is less than 25 percent of the height.

Connections of all beams and girders to columns, and of any other beams and girders on which the bracing of columns is dependent, in structures over 125 feet in height.

Roof-truss splices and connections of trusses to columns, column splices, column bracing, knee braces and crane supports, in all structures carrying cranes of over 5-ton capacity.

Connections for supports of running machinery, or of other live loads which produce impact or reversal.

Any other connections stipulated in the design plans.

For the purpose of this Section, the height of a tier structure shall be taken as the vertical distance from the curb level to the highest point of the roof beams, in the case of flat roofs or to the mean height of the gable, in the case of roofs having a rise of more than 1 in 4½. Where the curb level has not been established, or where the structure does not adjoin a street, the mean level of the adjoining land shall be used instead of curb level. Penthouses may be excluded in computing the height of structure.

No riveting or welding shall be done until the structure has been properly aligned.

Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

In the setting or erecting of steel work the individual pieces shall be considered plumb or level when the error does not exceed

1 to 500. For exterior columns and columns adjacent to elevator shafts of multiple story buildings, the error shall not exceed 1 to 1000 of the total height of the column.

SECTION 1511 — LIGHT STEEL CONSTRUCTION

1511.1 — SCOPE—GENERAL

Light steel construction, as defined for the purpose of this Code, is that type of construction built in total or in part with steel structural members, and/or panels cold formed of steel less than 3/16 inch thick and/or as excepted in Section 1501.1. Such members and panels may be used alone or in combination with other light steel structural members or with other materials when designed in accordance with good engineering practice and when alone or in combination are capable of supporting all required loads without exceeding the allowable unit stresses specified in this Section.

1511.2 — DESIGN AND MATERIALS

(a) The 1960 "Specifications for the Design of Light Gauge Cold-Formed Steel Structural Members" of the American Iron and Steel Institute may be accepted as recognized engineering practice.

(b) **Stresses and Material** — The unit design stress of steel of all grades shall in no case exceed the yield strength of the steel divided by 1.65. For steel conforming to Grade C ASTM Tentative specifications for Flat Rolled Carbon Steel Sheets of Structural Quality (ASTM A-245-58-T) or ASTM Tentative specifications for Hot Rolled Carbon Steel Strip of Structural Quality (ASTM-A-303-58-T) the maximum working stresses shall not exceed 20,000 lbs. per sq. in.

(c) **Thickness** — Light gage cold-formed steel shall be of thickness not less than the following, except that the use of material of less thickness may be allowed upon the submission of test data from approved authorities verifying the structural behavior of the members formed from such materials:

(1) Individual Structural Members and Floor Panel Members ..... 18 U.S. Standard Gage
(2) Roof Panel Members Supporting Roofing Materials and Load-Carrying Wall Panel Members not included in Item (4) herein ..... 22 U.S. Standard Gage
(3) Roof Panel Members not included in Item (2) herein ..... 26 U.S. Standard Gage
(4) Wall Panel Members and Siding Supporting No Loads From Roofs, Floors or Ceilings ..... 28 U.S. Standard Gage

(d) **Protection** — All structural panels for members formed of light gage steel shall have one shop coat of paint or equivalent protection.

SECTION 1512 — STEEL JOIST CONSTRUCTION

1512.1 — STEEL JOISTS — SHORTSPAN

(a) **Scope** — Steel Joist Construction as governed by the requirements of this Section shall be that type of construction in which decks or top slabs are supported by separate steel members herein designated as "Steel Joists," spaced not further apart than 24" on centers in floors and 30" on centers in roofs, but in no case spaced further apart than the safe span of the top slab, deck or floor. Such steel joists may be made of hot or cold formed sections, strip, or sheet steel, riveted or welded together, or by expanding.

> **Note**—Where steel joists are used at wider spacings than specified in the paragraph above, the construction shall not be considered Steel Joist Construction, but shall be designed and constructed in accordance with recognized engineering practice.

In manufacturing, storage or similar buildings subject to heavy concentrated or moving loads, use of steel joists, for floors shall be limited to live loads not exceeding 125 Lbs. per sq. ft., and adequate top slab and lateral support shall be provided to support and distribute such loads.

(b) **Material** — Steel shall conform to the requirements of the Tentative Specifications for Steel for Bridges and Buildings. (ASTM A7-58T) and (A36-60T), except that joists formed of strip or sheet steel shall conform to Grade C ASTM Tentative Specifications for Flat-Rolled Carbon Steel Sheets of Structural Quality (ASTM A-245-58-T) or ASTM Tentative Specifications for Hot-Rolled Carbon Steel Strip of Structural Quality (ASTM A-303-58-T).

(c) **Design and Maximum Stress** — Open web steel joists shall be designed as a truss, solid web steel joists as a beam. Deck or top slabs over steel joists shall not be assumed to carry any part of the compression stress in the steel joists.

For steel meeting the requirements of Section 1511.3(b) the maximum design stress shall not exceed 20,000 lbs. per Sq. In.

Compression chords and diagonals of open web steel joists shall not have a ratio of length (clear distance between welds or attachments) to least radius or gyration in excess of 120, nor shall the unit compression stress exceed 17,000 lbs. per Sq. In.

Steel joists or parts of joists formed of strip or sheet steel shall be designed in accordance with recognized engineering practice provided the unit design stress shall in no case exceed the yield strength of the steel divided by 1.65. The 1960 "Specifications for the Design of Light Gage Cold-Formed Steel Structural Members" of American Iron and Steel Institute may be accepted as recognized engineering practice.

(d) **Protective Coating**—All steel joists shall receive one coat of asphalt base paint or equvalent applied by dipping or spraying or an equivalent protective covering, before leaving the shop.

(e) **Manufacture** — All joints of the members that comprise a steel joist shall be made by connecting the members directly to one another by fusion or resistance welds, or by rivets.

In the case of expanded joists, a portion of the metal may be left intact to form a connection.

In the case of nailer joists, using wood nailer strips, such wood nailer strips, shall be firmly attached to the top chord of the joist. Such nailer strips shall be of good grade wood at least 1½" x 1½" in net section.

(f) **Anchorage**—The ends of steel joists shall extend a distance of at least four inches on masonry or reinforced concrete supports, and at least two and one-half inches on steel supports except that where opposite joists butt over a steel support and positive approved means of attachment to the steel support is furnished which will prevent displacement of the member, a shorter bearing length may be used to provide the necessary bearing area. Every third steel joist on concrete or masonry supports shall be anchored thereto with an anchor, equivalent to a ⅜-inch round bar. The ends of all steel joists supported on masonry walls shall be bedded in mortar.

All steel joists supported on steel beams shall be secured thereto with an anchor made of not less than a 3/16-inch round bar fastened over the flanges of supporting beams, or other equivalent approved attachment, except that in the case of buildings having a height of more than twice the least dimension of the base, each steel joist shall be welded, bolted or riveted to the supporting steel work.

(g) **Span** — The span of the joists shall not exceed 24 times the depth of the steel portion of the steel joist.

(h) **Bridging** — (1) As soon as steel joists have been erected and before application of construction loads, bridging shall be installed between them. This bridging shall be adequate to safely support the top cords or flanges against lateral movement during the construction period and shall hold the steel joists in an approximately vertical plane passing through the bearing. The steel joists at the ends of panels shall be braced laterally by anchors or ties at each line of bridging.

When slab reinforcing is of a pre-stressed type; in addition to the bridging, a reinforcing bar shall be welded to the top cord of steel bar joists. Bars shall be continuous and there shall be one (1) bar adjacent to each line of bridging. All bars shall have six (6) inch 90° bends at the ends and shall be turned down in the wall to form an anchor to take care of lateral stress.

(2) The number of lines of bridging shall be: one row, near the center, for spans up to 14 feet; two rows, one quarter spans apart, for spans 14 to 21 feet; three rows for spans 21 to 32 feet; and four rows for spans 32 to 40 feet.

(3) In the case of steel joists carrying a wood deck or equivalent, the deck may be used as the top member of the bridging system when the deck is securely nailed to the joists.

(i) **Ceiling Protection** — Where fire-resistive construction is required, steel joists shall be protected on the underside with a fire-resistive ceiling and with a top slab, all as is necessary for the assembly to provide the required degree of fire-resistance as set forth in Table 1007, provided that where wood joist construction is permitted, steel joists may have wood nailing strip attached to the top chord or top flange, and provided further that where steel joists are used in places where unprotected wood joists are permitted, no ceiling protection need be provided.

(j) **Decks or Top Slabs** — Decks or top slabs over steel joists may be of concrete or gypsum poured on metal lath centering or other equally suitable permanent centering, or on removable centering, provided the top chords or flanges of the steel joists are stayed laterally by the top slab.

Precast concrete top slabs, precast gypsum top slabs, wood decks, or steel decks may be used over steel joists provided they are securely anchored to the top chords or flanges of the joists.

(k) **Accepted Practice** — In the absence of specific requirements, as provided in this Section, short-span steel joist construction shall be governed by accepted engineering practice as defined in the Standard Specifications for Open-Web Steel Joist Construction—Short-Span Series (April 12, 1955 Edition) of the Steel Joist Institute.

1512.2 — STEEL JOISTS — LONGSPAN OPEN WEB

Steel Joists conforming to the "Standard Specifications for Open Web Steel Joists — Longspan Series" adopted by the Steel Joist Institute, April 28, 1953, may be designed and used as provided in that specification.

1513 — STEEL ROOF DECK CONSTRUCTION

(a) **Scope**—This Section shall govern the design of steel roof deck construction used on spans not over 10' 0" and shall govern when in conflict with other provisions of this Code. Its provisions shall apply to decks having longitudinal ribs spaced not over 6" on center and formed of metal not less than No. 22 U. S. Standard Gauge in thickness.

(b) **Uses**—Steel roof deck construction may be used on all structures. Where required to be of fire-resistive construction, it shall be protected on the underside with a ceiling, and protected above with insulation to provide the degree of fire-resistance specified in Chapter X.

(c) **Design and Material**

(1) **Stresses and Material** — The maximum working stress shall in no case exceed the yield strength of the steel divided by 1.65. For steel conforming to Grade C ASTM Tentative Specifications for Flat-Rolled Carbon Steel Sheets of Structural Quality (ASTM-A-245-58-T or ASTM Tentative Specifications for Hot-Rolled Carbon Steel Strip of Structural Quality (ASTM-A-303-58-T), the working stress shall not exceed 20,000 Lbs. Per Sq. In.

(2) **Properties** — For the purpose of determining the structural properties of steel roof decks, the effective width of the top flange between ribs shall be limited to the following percentages:

Thickness of Deck Metal	Width of Top Flange Effective
No. 18 U. S. Standard Gauge	75%
No. 20 U. S. Standard Gauge	62%
No. 22 U. S. Standard Gauge	53%

(3) **Moment and Deflection Co-efficients**—Where steel roof deck units extend over three or more spans, a moment co-efficient of 1/10th and a deflection co-efficient of 3/384 shall be used provided deck units are welded to the supports. All other steel deck installations shall be designed as simple spans.

(4) **Maximum Deflection** — The maximum deflection of steel roof deck under design live load shall not exceed 1/180 of the clear span except that where plastered ceilings are attached directly to or supported by such deck, the maximum deflection shall not exceed 1/360 of the clear span.

(5) **Anchorage** — Steel deck units shall be anchored to the supporting frame work to resist the following gross uplifts: 45 pounds per Sq. Ft. for eave overhang and monitor roofs. 30 pounds per Sq. Ft. for all other roof areas. The dead load of the roof deck construction may be deducted from the above forces.

(6) **Protection**—All steel roof decks shall have one shop coat of paint or equivalent protection.

TESTS — In lieu of designing according to Section 1513. C. tests may be made to determine the structural properties of a deck, based on the maximum allowable unit stress and maxmum deflection specified herein. Such tests shall be performed on bare metal deck on simple spans supported on knife edges, with concentrated loads applied at the quarter points of the span or uniform distributed loads pneumatically applied.

CHAPTER XVI

CONCRETE

MATERIALS, MIX AND DESIGN

SECTION 1601 — GENERAL

1601.1 — SCOPE

(a) These regulations cover the use of reinforced concrete and plain concrete in any structure to be erected under the provisions of this Building Code.

(b) The design of all reinforced concrete structures, including all of their component parts, shall be in accordance with the requirements as set forth in Building Code Requirements for Reinforced Concrete, Serial Designation ACI 318-56*, as published by the American Concrete Institute.

1601.2 — PERMITS AND DRAWINGS

Drawings and typical details of all reinforced concrete construction showing the size and position of all structural members, metal reinforcement, design strength of concrete, and the live load used in the design shall be filed with the Building Department as a permanent record before a permit to construct such work will be issued. All plans submitted for approval or use on the work shall clearly show the strength of concrete at a specified age for which all parts of the structure were designed. Calculations pertaining to the design shall be filed with the drawing when required by the Building Official.

1601.3 — SPECIAL SYSTEMS OF REINFORCED CONCRETE

The sponsors of any special system of reinforced concrete that is in conflict with, or not covered by, provisions of this Chapter may apply to the Board of Adjustments and Appeals as set forth in Section 112 — Appeals.

1601.4 — DEFINITIONS

The following terms are defined for use in this code:

Aggregate—Inert material which is mixed with portland cement and water to produce concrete.

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*May be secured from American Concrete Institute, 18263 W. McNICHOLS ROAD, Detroit, Michigan.

Column—An upright compression member the length of which exceeds three times its least lateral dimension.

Column Capital—An enlargement of the upper end of a reinforced concrete column designed and built to act as a unit with the column and flat slab.

Column Strip—A portion of a flat slab panel one-half panel in width consisting of the two adjacent quarter-panels on either side of the column center lines and extending through the panel in the direction of the span considered for bending.

Combination Column—A column in which a structural steel section, designed to carry the principal part of the load, is wrapped with wire and encased in concrete of such quality that some additional load may be allowed.

Composite Column—A column in which a steel or cast-iron section is completely encased in concrete containing spiral and longitudinal reinforcement.

Concrete—A mixture of portland cement, fine aggregate, coarse aggregate and water.

Deformed Bar—A reinforcing bar conforming to the "Tentative Specifications for Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement" (ASTM designation A305-56T). Bars not conforming to these Specifications shall be classed as plain bars. Wire mesh with welded intersections not farther apart than 6 inches in the direction of the principal reinforcement and with cross wires not smaller than No. 10 W & M gage may be rated as a deformed bar.

Diagonal Band—A group of reinforcing bars covering a width approximately 0.4 the average span, placed symmetrically with respect to the diagonal running from corner to corner of the panel of a flat slab.

Direct Band—A group of reinforcing bars covering a width approximately 0.4 of l_1 placed symmetrically with respect to the center lines of the supporting columns of a flat slab.

Drop Panel—The structural portion of a flat slab which is thickened in the area surrounding the column capital.

Effective Area of Concrete—The area of a section which lies between the centroid of the tensile reinforcement and the compression face of the flexural member.

Effective Area of Reinforcement—The area obtained by multiplying the right cross-sectional area of the reinforcement by the cosine of the angle between its direction and the direction for which the effectiveness is to be determined.

Flat Slab—A concrete slab reinforced in two or more directions, generally without beams or girders to transfer the loads to supporting columns.

Middle Strip—A portion of a flat slab panel one-half panel in width symmetrical about the panel center line and extending through the panel in the direction of the span considered for bending.

Paneled Ceiling—A flat slab in which approximately that portion of the area enclosed within the intersection of the two middle strips is reduced in thickness.

Panel Length—The distance along a panel side from center to center of columns of a flat slab.

Pedestal—An upright compression member whose height does not exceed three times its least lateral dimension.

Plain Concrete—Concrete without reinforcement, or reinforced only for shrinkage or temperature changes.

Ratio of Reinforcement—The ratio of the effective area of the reinforcement to the effective area of the concrete at any section of a flexural member.

Reinforced Concrete—Concrete in which reinforcement other than that provided for shrinkage or temperature changes is embedded in such a manner that the two materials act together in resisting forces.

Surface Water—The water carried by the aggregate except that held by absorption within the aggregate particles themselves.

SECTION 1602 – MATERIALS AND TESTS

1602.1 — TESTS

(a) The Building Official, or his authorized representative, shall have the right to order the test of any material entering into concrete or reinforced concrete when there is reasonable doubt as to its suitability for the purpose; to order reasonable tests of the concrete from time to time to determine whether the materials and methods in use are such as to produce concrete of the necessary quality; and to order the test under load of any portion of a completed structure, when the conditions have been such as to leave reasonable doubt as to the adequacy of the structure to serve the purpose for which it is intended.

(b) Tests of materials and of concrete shall be made in accordance with the requirements of the American Society for Testing Materials as noted elsewhere in this chapter. The complete records of such tests shall be available for inspection by the Building Official at all times during the progress of the work, and shall be preserved by the engineer or architect for two years after the completion of the structure.

1602.2 — LOAD TESTS

When a load test is required, the member or portion of the structure under consideration shall be subject to a superimposed load

equal to one and one-half times the live load plus one-half of the dead load. This load shall be left in position for a period of twenty-four hours before removal. If, during the test, or upon removal of the load, the member or portion of the structure shows evident failure, such changes or modifications as are necessary to make the structure adequate for the rated capacity shall be made; or, where lawful, a lower rating shall be established. The structure shall be considered to have passed the test if the maximum deflection at the end of the twenty-four hour period does not exceed the value of D as given in the following:

$$D = \frac{.001\ L^2}{12\ t} \quad \text{.....(1)}$$

all terms expressed in the same units, in which

D = Deflection of a floor member under load test.

L = Span of member under load test.

t = The total thickness or depth of a member under load test.

If the deflection exceeds the value of D as given in formula (1), the construction shall be considered to have passed the test if within twenty-four hours after the removal of the load the member or portion of the structure shows a recovery of at least seventy-five per cent of the observed deflection.

1602.3 — SUPERVISION

All concrete work shall be supervised by the architect or engineer responsible for its design, or by a competent representative responsible to the architect or engineer. A record shall be kept of such supervision, which record shall cover the quality and quantity of concrete materials, the mixing and placing of the concrete, and the placing of the reinforcing steel. A complete record shall also be kept of the progress of the work and of the temperatures, when these fall below 40 degrees F., and of the protection given to the concrete while curing. This record shall be available for inspection by the Building Official at all times during the progress of the work and shall be preserved by the architect or engineer for two years after the completion of the work.

1602.4A — PORTLAND CEMENT

Portland cement shall conform to the "Standard Specifications for Portland Cement" (ASTM Serial Designation: C150-59).

1602.4B — SLAG CEMENT

All slag cement that is used for making mortar or in a blend with Portland for concrete shall be in accordance with the "Standard Specifications for Slag Cement" (ASTM Serial Designation: C358-58).

1602.5 — CONCRETE AGGREGATES

(a) Concrete aggregates shall conform to the "Standard Specifications for Concrete Aggregates" (ASTM Serial Designation: C33-59), provided however, that aggregates which have been shown by test or actual service to produce concrete of the required strength, durability, water-tightness, fire-resistance, and wearing qualities may be used under Section 1603.2 Method 2, where authorized by the Building Official.

(b) The maximum size of the aggregate shall be not larger than one-fifth of the narrowest dimension between sides of the forms of the member for which the concrete is to be used nor larger than three-fourths of the minimum clear spacing between reinforcing bars.

1602.6 — WATER

Water used in mixing concrete shall be clean, and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances.

1602.7 — METAL REINFORCEMENT

(a) Metal reinforcement shall conform to the requirements of the "Tentative Specifications for Billet-Steel Bars for Concrete Reinforcement" (ASTM Serial Designation: A-15-58T), or for "Rail-Steel Bars for Concrete Reinforcement" (ASTM Serial Designation: A-16-59T, or Axle-Steel Bars for Concrete Reinforcement" (ASTM Serial Designation: A160-57T).

Deformations on deformed bars shall conform to "Tentative Specifications for Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement" (ASTM Serial Designation: A305-56T).

(b) Cold-drawn wire or welded wire fabric for concrete reinforcement shall conform to the requirements of the "Tentative Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement" (ASTM Serial Designation: A82-58T), or "Tentative Specifications for Welded Steel Wire Fabric for Concrete Reinforcement" (ASTM Serial Designation: A185-58T).

(c) Structural steel shall conform to the requirements of the "Tentative Specifications for Structural Steel for Bridges and Buildings" (ASTM Serial Designation: A7-58T).

(d) Cast-iron sections for composite columns shall conform to the "Standard Specifications for Cast-Iron Pressure Pipe" (ASTM Serial Designation: A377-57).

1602.8 — STORAGE OF MATERIALS

Cement and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete.

SECTION 1603 — CONCRETE QUALITY AND WORKING STRESSES

1603.1 — CONCRETE QUALITY

All plans, submitted for approval or used on the job, shall clearly show the assumed strength of concrete at a specified age for which all parts of the structure were designed.

1603.2 — DETERMINATION OF STRENGTH-QUALITY OF MATERIALS

The determination of the proportions of cement and water to attain the required strengths shall be made by one of the following methods:

Method 1—Concrete made from average materials:

When no preliminary tests of the materials to be used are made, the water-content per sack of cement shall not exceed the values in Table 1603.2. Method 2 shall be employed when artificial aggregates or admixtures are used.

Table 1603.2 — Assumed Strength of Concrete Mixtures

Assumed Compressive Strength At 28 Days	Min. Sks. Cement Per C.Y. Conc.	Maximum Permissable Water-Cement Ratio U.S. Gal./94# Sack of Cement	
		Non Air-Entrained Concrete	Air-Entrained Concrete
2000	5	8	7¼
2500	5	7¼	6¼
3000	5½	6½	5¼
3500	6	5¾	4½
4000	6½	5	4

Note—In interpreting this table, surface water carried by the aggregate must be included as part of the mixing water in computing the water content.

Method 2—Controlled Concrete:

Water-content other than shown in Table 1603.2 may be used provided that the strength-quality of the concrete proposed for use in the structure shall be established by tests which shall be made in advance of the beginning of operations, using the consistencies suitable for the work and in accordance with the "Standard Method of "Test for Compressive Strength of Molded Concrete Cylinders" (ASTM Serial Designation: (C39-59). A curve representing the relation between the water-content and the average 28-day compressive strength or earlier strength at which the concrete is to receive its full working load, shall be established for a range of values including all the compressive strengths called for on the plans.

The curve shall be established by at least three points, each point representing average values from at least four test specimens. The maximum allowable water-content for the concrete for the structure

shall be as determined from this curve and shall correspond to a strength which is fifteen per cent greater than that called for on the plans. No substitutions shall be made in the materials used on the work without additional tests in accordance herewith to show that the quality of the concrete is satisfactory.

1603.3 — CONCRETE PROPORTIONS AND CONSISTENCY

(a) The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve (fine aggregate) shall not be less than thirty per cent nor greater than fifty per cent of the total, except that these proportions do not necessarily apply to light-weight aggregates.

(b) The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work.* Measurement of materials for ready mixed concrete shall conform to the "Standard Specifications for Ready-Mixed Concrete" (ASTM Serial Designation: (C94-58).

(c) When controlled concrete is used and the quality and strength have been determined by test as outlined by Method 2, Section 1603.2, the proportions of materials shall be determined at time of test, and a record of the tests and proposed proportions shall be filed with the Building Official for his approval.

1603.4 — ALLOWABLE UNIT STRESSES IN CONCRETE

The unit stresses in pounds per square inch on concrete to be used in the design shall not exceed the value of Table 305 (a) as set forth in the Building Code Requirements for Reinforced Concrete, Serial Designation ACI 318-56, as published by the American Concrete Institute.

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* Whenever practicable such measurement shall be by weight rather than by volume.

ALLOWABLE UNIT STRESSES IN REINFORCEMENT

Unless otherwise provided in these Regulations, steel for concrete reinforcement shall not be stressed in excess of the following limits:

(a) Tension

(fs = Tensile unit stress in longitudinal reinforcement)
and (fv = Tensile unit stress in web reinforcement)

20,000 p.s.i. for Rail-Steel Concrete Reinforcement Bars, Billet-Steel Concrete Reinforcement Bars (of intermediate and hard grades),

Axle-Steel Concrete Reinforcement Bars (of intermediate and hard grades), and Cold-Drawn Steel Wire for Concrete Reinforcement.

18,000 p.s.i. for Billet-Steel Concrete Reinforcement Bars (of structural grade), and Axle-Steel Concrete Reinforcement Bars (of structural grade).

(b) Tension in One-Way Slabs of Not More Than 12 Feet Span
(fs = Tensile unit stress in main reinforcement).

For the main reinforcement ⅜ inch or less in diameter, in one-way slabs, 50 per cent of the minimum yield point specified in the Standard Specifications of the American Society for Testing Materials for the particular kind and grade of reinforcement used, but in no case to exceed 30,000 p.s.i.

(c) Compression, Vertical Column Reinforcement
(fs = Nominal working stress in vertical column reinforcement).

Forty per cent of the minimum yield point specified in the Standard Specifications of the American Society for Testing Materials for the particular kind and grade of reinforcement used, but in no case to exceed 30,000 p.s.i.

(fr = Allowable unit stress in the metal core of composite and combination columns):

Structural steel sections	16,000 p.s.i.
cast iron sections	10,000 p.s.i.
Steel pipe	See (ACI 318-56).

1603.5 — TESTS ON CONCRETE

(a) The Building Official may require a reasonable number of compression tests to be made during the progress of the work. Such tests shall be made in accordance with the "Standard Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Field" (ASTM Serial Designation (C31-59), and cured in accordance with the requirements for laboratory control tests.

(b) Not less than three specimens shall be made for each test; nor less than one test for each 250 cu. yd. of concrete.

(c) The standard age of test shall be 28 days, but 7-day tests may be used provided that the relation between the 7- and 28-day strengths of the concrete is established by test for the materials and proportions used.

(d) Where the average strength of the laboratory control cylinders for any portion of the structure falls below the minimum ultimate compressive strengths called for on the plans, the Building Official shall have the right to order a change in the mixture or in the water-content for the remaining portion of the structure. In cases where the average strength of the cylinders cured on the job falls below the required strength, the Building Official shall have the right to require conditions of temperature and moisture necessary to secure the required strength. If the average strength of either the laboratory control cylinders or the cylinders cured on the job

falls below the required strength, load tests as specified in Section 1602.2 may be required on the portion of the structure so affected.

SECTION 1604 — MIXING AND PLACING CONCRETE

1604.1 — PREPARATION OF EQUIPMENT AND PLACE OF DEPOSIT

(a) Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned, all debris and ice shall be removed from the spaces to be occupied by the concrete, forms shall be thoroughly wetted (except in freezing weather, or oiled, and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather), and the reinforcement shall be thoroughly cleaned of ice or other coatings.

(b) Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Building Official.

1604.2 — MIXING OF CONCRETE

(a) Unless otherwise authorized by the Building Official, the mixing of concrete shall be done in a batch mixer of approved type.

(b) The concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.

(c) For job mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturers and mixing shall be continued for at least one minute after all materials are in the mixer. A longer mixing period may be required for mixers larger than one cubic yard capacity.

(d) Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in the "Standard Specifications for Ready-Mixed Concrete" (ASTM Serial Designation (C94-59).

1604.3 — CONVEYING

(a) Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of the materials.

(b) Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of the materials.

1604.4 — DEPOSITING

(a) Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. The concreting shall be carried on at such a rate that the concrete is at

all times plastic and flows readily into the space between the bars. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited on the work, nor shall retempered concrete be used.

(b) When concreting is once started, it shall be carried on as a continuous operation until the placing of the panel or section is completed. The top surface shall be generally level. When construction joints are necessary, they shall be made in accordance with Section 1605.8.

(c) All concrete shall be thoroughly compacted by suitable means during the operation of placing, and shall be thoroughly worked around the reinforcement and embedded fixtures and into the corners of the forms. Vibrators may be used to aid in the placement of the concrete provided they are used under experienced supervision, and the forms are designed to withstand their action.

(d) Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete, shall first be deposited in the forms to a depth of at least one inch.

1604.5 — CURING

In all concrete structures, concrete made with normal portland cement shall be maintained in a moist condition for at least the first seven days after placing and high-early-strength concrete shall be so maintained for at least the first three days.

1604.6 — COLD WEATHER REQUIREMENTS

(a) Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near-freezing weather. No frozen materials or materials containing ice shall be used.

(b) All concrete materials and all reinforcement, forms, fillers and ground with which the concrete is to come in contact, shall be free from frost. Whenever the temperature of the surrounding air is below 40 degrees Fahrenheit, all concrete when placed in the forms shall have a temperature of between 60 and 90 degrees Fahrenheit and shall be maintained at a temperature of not less than 50 degrees Fahrenheit for at least 72 hours for normal concrete or 24 hours for high-early-strength concrete, or for as much more time as is necessary to insure proper rate of curing of the concrete. The housing, covering or other protection used in connection with curing shall remain in place and intact at least twenty-four hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing. Manure, when used for protection, shall not be allowed to come into contact with the concrete.

SECTION 1605 — FORMS AND DETAILS OF CONSTRUCTION

1605.1 — DESIGN OF FORMS

Forms shall conform to the shape, lines, and dimensions of the members as called for on the plans, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape.

1605.2 — REMOVAL OF FORMS

Forms shall be removed in such manner as to insure the complete safety of the structure. Where the structure as a whole is supported on shores, the removable floor forms, beam and girder sides, columns and similar vertical forms may be removed after twenty-four hours, providing the concrete is sufficiently hard not to be injured thereby. In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to support safely their weight and the load thereon. The results of suitable control tests may be used as evidence that the concrete has attained sufficient strength.

1605.3 — PIPES, CONDUITS, ETC., EMBEDDED IN CONCRETE

Pipes which will contain liquid, gas or vapor at other than room temperature shall not be embedded in concrete necessary for structural stability or fire protection. Drain pipes and pipes whose contents will be under pressure greater than atmospheric pressure by more than one pound per square inch shall not be embedded in structural concrete except in passing through from one side to the other of a floor, wall or beam. Electric conduits and other pipes whose embedment is allowed shall not, with their fittings, displace that concrete of a column on which stress is calculated or which is required for fire protection, to greater extent than four per cent of the area of the cross section. Sleeves or other pipes passing through floors, walls or beams shall not be of such size or in such location as unduly to impair the strength of the construction; such sleeves or pipes may be considered as replacing structurally the displaced concrete, provided they are not exposed to rusting or other deterioration, are of uncoated iron or steel not thinner than standard wrought-iron pipe, have a nominal inside diameter not over two inches, and are spaced not less than three diameters on centers. Embedded pipes or conduits other than those merely passing through, shall not be larger in outside diameter than one-third the thickness of the slab, wall or beam in which they are embedded; shall not be spaced closer than three diameters on centers, nor so located as unduly to impair the strength of the construction. Circular uncoated or galvanized electric conduit of iron or steel may be considered as replacing the displaced concrete.

1605.4 — CLEANING AND BENDING REINFORCEMENT

Metal reinforcement, at the time concrete is placed, shall be free from rust scale or other coatings that will destroy or reduce the bond. Bends for stirrups and ties shall be made around a pin having a diameter not less than two times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness of the bar, except that for bars larger than one inch, the pin shall be not less than eight times the minimum thickness of the bar. All bars shall be bent cold.

1605.5 — PLACING REINFORCEMENT

(a) Metal reinforcement shall be accurately placed and adequately secured in position by concrete or metal chairs or spacers. The minimum clear distance between parallel bars, except in columns, shall be equal to the nominal diameter of the bars. In no case shall the clear distance between bars be less than 1 in., nor less than one and one-third times the maximum size of the coarse aggregate. Where reinforcement in beams or girders is placed in two or more layers, the clear distance between layers shall not be less than 1 in., and the bars in the upper layers shall be placed directly above those in the bottom layer.

(b) When wire or other reinforcement, not exceeding one-fourth inch in diameter is used as reinforcement for slabs not exceeding ten feet in span, the reinforcement may be curved from a point near the top of the slab over the support to a point near the bottom of the slab at mid-span; provided such reinforcement is either continuous over, or securely anchored to the support.

1605.6 — SPLICES AND OFFSETS IN REINFORCEMENT

(a) In slabs, beams and girders, splices of reinforcement at points of maximum stress shall generally be avoided. Splices shall provide sufficient lap to transfer the stress between bars by bond and shear. In such splices the minimum spacing of bars shall be as specified in Section 1605.5.

(b) Where changes in the cross section of a column occur, the longitudinal bars shall be offset in a region where lateral support is afforded. Where offset, the slope of the inclined portion shall not be more than 1 in 6, and in the case of tied columns the ties shall be spaced not over three inches on centers for a distance of one foot below the actual point of offset.

1605.7 — CONCRETE PROTECTION FOR REINFORCEMENT

(a) The reinforcement of footings and other principal structural members in which the concrete is deposited against the ground shall have not less than three inches of concrete between it and the ground contact surface. If concrete surfaces after removal of the

forms are to be exposed to the weather or be in contact with the ground, the reinforcement shall be protected with not less than two inches of concrete for bars more than ⅝ inch in diameter and one and one-half inches for bars ⅝ inch or less in diameter.

(b) The concrete protective covering for reinforcement at surfaces not exposed directly to the ground or weather shall be not less than three-fourths inch for slabs and walls; and not less than one and one-half inches for beams, girders and columns. In concrete joist floors in which the clear distance between joists is not more than thirty inches, the protection of metal reinforcement shall be at least three-fourths inch.

(c) If this code specifies (Chapter X), as fire-protective covering of the reinforcement, thickness of concrete greater than those given in this section, then such greater thickness shall be used.

(d) Concrete protection for reinforcement shall in all cases be at least equal to the diameter of round bars, and one and one-half times the side dimension of square bars.

(e) Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

1605.8 — CONSTRUCTION JOINTS

(a) Joints not indicated on the plans shall be so made and located as to least impair the strength of the structure. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed. In addition to the foregoing, vertical joints shall be thoroughly wetted but not saturated, and slushed with a coat of neat cement grout immediately before placing of new concrete.

(b) At least two hours must elapse after depositing concrete in the columns or walls before depositing in beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith.

(c) Construction joints in floors shall be located near the middle of the spans of slabs, beams, or girders, unless a beam intersects a girder at this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. In this last case provision shall be made for shear by use of inclined reinforcement.

CHAPTER XVII

WOOD CONSTRUCTION PRACTICE, DESIGN AND QUALITY

SECTION 1700 — GENERAL

The first part of this Chapter is concerned with construction practices and the second part with design and quality.

1700.1 — GENERAL

(a) The quality and design of all wood members used for load supporting purposes in buildings or other structures shall conform to the standards hereinafter specified.

(b) All members shall be so framed, anchored, tied and braced together as to develop the strength and rigidity necessary for the purpose for which they are used.

1700.2 — DETERMINATION OF REQUIRED SIZES

(a) All wood structural members shall be of sufficient size to carry the dead and required live loads without exceeding the allowable working stresses as hereinafter specified.

(b) Minimum sizes of lumber members required by this Code refer to nominal sizes. American Lumber Standard dressed sizes shall be accepted as the minimum net sizes conforming to nominal sizes. Computations to determine the required sizes of members shall be based on the net dimensions (actual size) and not the nominal sizes. If rough sizes or finish sizes exceeding American Lumber Standard dressed sizes are to be used, computations may be predicated upon such actual sizes provided they are specified on the plans or in statement appended thereto. For convenience, nominal sizes may be shown on the plans. All lumber members 2" and less in thickness shall contain not more than 19 per cent moisture at the time of permanent incorporation into a building or structure.

(c) The Building Official may require the species and grade or the stress-grade of all lumber used for load bearing purposes to be stated on the plans filed with the Building Department.

(d) All framing lumber shall be grade-marked with the stamp of an approved grading agency for that species.

1700.3 — WOOD PRESERVATIVES

(a) Where wood preservatives are used they shall conform to the types and be applied by the method as given in Appendix "C".

(b) The Building Official may require the type of preservative and method of application to be stated on the plans filed with the Building Department.

SECTION 1701 — CONSTRUCTION PRACTICES

1701.1 — PREPARATION OF BUILDING SITE

All building sites shall be graded so as to provide drainage under all portions of the building not occupied by basements or cellars. All stumps and roots shall be removed from the soil to a depth of at least twelve (12) inches.

1701.2 — REMOVAL OF DEBRIS

After all work is completed loose wood and debris shall be completely removed from all spaces under the building. All wood forms and supports shall be completely removed. Loose or casual wood shall not be stored in contact with the ground under any building.

1701.3 — FOUNDATIONS

Foundations shall be designed and constructed in accordance with the provisions of Section 1302. Where spot piers are used in one and two family dwellings unless properly designed, spacing of such piers shall not exceed eight (8) Ft. center to center. The top of every masonry or concrete foundation, wall or pier, which supports and is in contact with wood construction of any kind shall be not less than six (6) inches above the finished grade.

1701.4 — MUD SILLS

A one (1) story building, except a dwelling, which does not exceed six hundred (600) square feet in area, may be constructed without a masonry or reinforced concrete foundation, providing such building is placed on a sill of heart grade, redwood, southern yellow pine, cedar or tidewater cypress. Also other grades and species of lumber may be used for sills if pressure-treated with an approved preservative. No mud sill shall be less than nominal two inches by six inches (2 x 6) or three inches by four inches (3 x 4) in cross section.

1701.5 — FOUNDATION WALL VENTS

Space under first floor joists, except in such space as is occupied by a basement or cellar, shall be provided with openings to insure ventilation. Such ventilating openings shall be proportioned on the basis of not less than one and one-half (1½) Sq. Ft. net opening for each fifteen (15) lineal feet or major fraction thereof of exterior wall. Vents shall be so placed as to provide ventilation at all points and prevent dead air pockets; they need not be placed in the front of the building. Such openings shall be screened with not more than one-half (½) inch mesh galvanized hardware cloth.

1701.6 — CLEARANCE

There shall be clearance of not less than eighteen (18) inches between the bottom of untreated wood framing and the ground beneath; except as provided in Section 1701.4 and Section 1701.7.

1701.7 — FOUNDATION SILLS

All masonry shall be finished to provide a true and even bearing surface for wooden structural members. Such structural members shall be securely fastened to the masonry or concrete bearing surface. All foundation sills (except dwellings) shall be bolted with not less than one-half (½) inch diameter bolts securely embedded in the masonry spaced not more than six (6) feet apart.

All wood foundation sills which are less than 18 inches above exposed unprotected ground under the building, shall be a heartwood grade of a durable species as listed in Section 1701.4 or shall be pressure treated with an approved preservative. All foundation sills shall be separated from contact with foundations of unit masonry by not less than 28 ga. galvanized iron or other approved corrosion-resistant metal, or by slate or may be bedded in 1:3 cement mortar.

All sleepers imbedded in or on concrete on ground shall be pressure treated lumber or heart grade Redwood, Cedar or Tidewater Cypress.

(See Appendix "B" for Termite Control)

SECTION 1702 — VERTICAL MEMBERS

1702.1 — COLUMNS AND POSTS

All wood columns or posts supporting loads shall be framed to true end bearings; shall extend downward to supports of such design as to hold the column or post securely in position and to protect its base from deterioration. Bottom or lowest tiers shall be supported at least two (2) inches above grade, or finish floor, by masonry or concrete footings and separated there-from by a metal plate not less than one-quarter (¼) inch thick; shall not rest directly or indirectly on floor beams except in cases where there is no column below; shall not exceed load limitations as specified in Section 1707.

Wood posts, timbers, or columns, when used in ground contact, or in damp, below grade locations, or when built into masonry partitions or walls in basements shall be a heart grade of a recognized durable species or shall be pressure treated with an approved preservative.

1702.2 — STUD WALLS AND PARTITIONS

The maximum allowable height for nominal size two by four (2x4) inch studding for bearing walls or partitions shall be fourteen (14) feet and for two by six (2x6) inch nominal size twenty (20) feet, spaced not more than sixteen (16) inches on center, unless the wall

is supported laterally by adequate framing in a horizontal direction perpendicular to the direction of the stud wall, or each stud is designed as a column with stresses not exceeding those allowed by this Chapter.

Bearing walls and partitions of residential buildings supporting more than two floors and a roof and of other buildings supporting more than one story and roof shall have lowest tier of studs not less than two by six (2x6) inches in nominal size.

Where studding extends through more than one floor, the floor joist of the second floor may be supported by a one by four (1x4) inch nominal size ribbon, notched into the studs and securely nailed.

In bearing partitions or walls, studs shall be provided with top and bottom plates lapped at each intersection. Single bottom plates may be used. Single top and bottom plates shall be permitted for non-bearing walls and partitions. Joints shall be staggered not less than two (2) feet; and such plates shall be not less in size than the studding.

In non-bearing walls and partitions studs may be spaced not more than twenty-eight (28) inches on centers, and may be set with long dimension parallel to the wall.

Angles at corners where stud walls or partitions meet shall be framed solid so no lath can extend from one room to another. All exterior and main cross stud partitions shall be effectively and thoroughly angle braced.

Where studs pass through from floor to floor they shall be fire-stopped at point of passage through floors in conformance to the provisions of Section 1702.6.

1702.3 — PROTECTION OF OPENINGS

Openings in partitions and walls shall be framed around with double studs at each side and double headers across the top resting on the short stud at each end, unless other equal approved method of framing is used.

The double header shall be placed on edge and shall be trussed above all openings over four (4) feet in width, or where more than two (2) studs are cut away.

1702.4 — CORNER BRACING

Studs shall be doubled or tripled at corners of exterior walls and such corners shall be braced by a let-in one by four (1x4) inch or one by six (1x6) inch continuous diagional brace, extending from the top plate to the bottom plate at a forty-five degree angle. Where windows, or other openings, preclude use of such bracing, alternative bracing approved by the Building Official may be used.

Let-in bracing may be omitted where "Solid Sheathing" of walls is of lumber applied diagonally or where other sheathing specified in

Section 1705.2 is applied vertically in panels 4 feet wide and not less than 8' long and properly nailed as follows:

SHEATHING	NAIL SIZE	SPACING OF EDGES	SPACING AT OTHER BEARINGS
*Plywood	6 d. common	6 inches	12 inches
Fiberboard	8 d. common	3 inches	6 inches
Gypsum	11 g. galvanized	4 inches	8 inches

*May be applied horizontally or vertically.

1702.5 — CLEARANCE FOR PIPES

Stud walls containing plumbing, heating or other pipes shall be so framed as to allow proper clearance for such pipes. Where a partition containing such pipes runs parallel to the floor joists, the floor joists under such partitions shall be doubled and spaced to provide clearance for such pipes and shall be bridged with solid bridging. Where plates or soles are cut to permit passage of such pipes, a metal tie not less than one-eighth (⅛) inch thick and one and one-half (1½) inch wide shall be fastened to the plate across and to each side of the opening with not less than four (4) 16d nails.

1702.6 — FIRESTOPPING

Firestopping shall be provided to cut off all vertical and horizontal concealed draft openings. Firestopping shall be as indicated in this Section and as provided in Section 705.

Firestopping, when of wood, shall be of not less than two (2) inch nominal thickness and shall effectively fill all spaces to the entire width of the framing or structural members.

Firestopping, when of other materials, shall be of formed coated steel of not less than twenty (20) U. S. Standard Gauge, securely and tightly nailed, or, in the case of spaces between chimneys, and wood framing, such spaces shall be solidly filled with mortar or loose incombustible matter supported on non-combustible supports.

Firestopping shall be used in the following locations:

1. In all stud walls, partitions and furred spaces, so that no concealed space exceeds eight (8) feet in length.
2. In all stud walls at ceiling and floor levels.
3. Between stair stringers at least once in the middle of each run, at the top and the bottom, and between studs, along and in line with the adjoining run of stairs.
4. Between chimneys, fireplaces and wood framing, except in the case of approved metal chimney installations as set forth in 802.1 (d) Suspended or Metal Chimneys.
5. Around the top, bottom and side of sliding door pockets.
6. Any other spaces not specifically mentioned above which would allow the passage of flame.

1702.7 — FLASHING

Every exterior opening shall be flashed with coated steel or with non-corrodible sheet metal in such manner as to be waterproof.

SECTION 1703 — HORIZONTAL MEMBERS

1703.1 — ANCHORAGE

Anchors for each tier of joists and rafters shall be provided where they enter masonry walls and where they are parallel to masonry walls. Such anchors shall be of metal of an approved type and spaced not more than six (6) feet apart. Such anchors shall, in all cases, occur on the opposite end of the same run of joists. Ends of joists shall be lapped and spiked so as to form a continuous tie across the building.
(See Appendix "D" for Hurricane Anchors)

1703.2 — CUTS AND BORE HOLES

Cuts and bore holes in wood girders, beams or joists shall be not deeper than one-fifth (1/5) the beam depth below its top and not further from the beam end than three (3) times the beam depth. Any cut that does not conform to above limitations, or bore holes two (2) inches or more in diameter are not permitted without special provisions for reinforcing the beam. Such reinforcement shall be approved by the Building Official.

1703.3 — GIRDERS, BEAMS AND TRUSSES

The design, quality and strength of girders, beams and trusses shall be in accordance with Section 1707.

1703.4 — BEARING

All masonry shall be finished to provide a true and even bearing surface for wooden structural members. Girders and beams entering or bearing on masonry shall have at least four (4) inches of end bearing, firecut three (3) inches, and shall be separated from the opposite side of the wall, or from members entering from the opposite side of the wall by at least four (4) inches of solid masonry. Girders and beams shall be provided with metal wall boxes of an approved type which will provide air space of at least one-half (½) inch on sides and top, or wall bearing plates and anchors, so set as to provide at least one (1) inch of air space around sides and end; or may be sealed in if timbers are protected by an approved preservative treatment.
(See Appendix "C")

1703.5 — TRUSSES

Timber trusses shall be securely anchored to the wall at all points of bearing. Members shall not be stressed in excess of stresses provided for in Section 1707.

Wood trusses and truss framing shall have all joints accurately cut and fitted together so that each bearing is true and drawn tight to the full bearing. All trusses shall be properly secured in place by lateral bracing.

Washers of sufficient size to distribute the loads properly shall be used in connection with rods or metal members. Before a truss is loaded, the tension rods shall be well tightened.

(See Appendix "D" for Hurricane Anchors)

SECTION 1704 — JOISTS

1704.1 — JOISTS

Floor joists shall be so designed as to adequately sustain all imposed live loads as set forth in Section 1203. For allowable span and spacing of joists the following references are given:

1. For one and two family dwellings:
   Section 1704.6, Joists of other species, grades, or sizes may be used when properly designed.
2. For all loadings other than above, design shall be in accordance with Section 1707.

1704.2 — BEARING

Floor joists shall be supported by sills, girders, bearing partitions or exterior walls. Where entering exterior stud walls, the joists shall be supported on a plate or, if no plate is provided, by a one by four (1x4) inch nominal size ribbon let in the studs. Joists shall be well nailed to the supporting studs. Studs shall be doubled under the ends of doubled joists. Where joists enter or bear on masonry see Section 1703.4.

1704.3 — HEADER JOISTS

Header and trimmer joists more than four (4) feet long shall be doubled. Header joists over six (6) feet long and tail joists over twelve (12) feet long shall be hung in approved stirrup irons or joists hangers or approved equivalent.

1704.4 — JOISTS UNDER PARTITION

Joist under and parallel to bearing partition walls shall be doubled and well spiked so as to form a solid beam. Where clearance for pipes is necessary solid bridging not more than sixteen inches on centers shall be provided (Section 1702.5).

1704.5 — BRIDGING

Cross bridging shall be placed between joists if the span is over eight (8) feet. The distance between bridging or between bridging and bearing, shall not exceed eight (8) feet. Wood cross bridging used in one and two family dwellings shall be not less than one by three (1 x 3) inches nominal size cross sectional area, but in other

buildings shall be not less than one by six (1 x 6) inches or two by three (2 x 3) inches nominal size. Metal cross bridging of equal or greater strength may be used in place of wood cross bridging.

Solid bridging shall be placed between floor joists at all supports.

1704.6 — MAXIMUM ALLOWABLE SPANS

Table No. 1704.6 gives the maximum allowable spans, according to spacing shown, for floor joists based on f-1200 and E-1,760,000 pounds per sq. in. and based on a live load of 40 and 30 psf plus 10 psf dead load uniformly distributed. Deflection limitation is based on 1/360 up to and including 10 feet, varying proportionately to 1/480 at 24 feet.

Floor joists of other grades, or of other sizes, may be used provided they are not stressed to exceed the maximum allowable working stress as shown in Table 1707.

TABLE 1704.6 — MAXIMUM ALLOWABLE SPAN BETWEEN SUPPORTS FOR WOOD JOISTS

Joist Size (Nominal) Inches	Joist Spacing Center to Center Inches	Maximum Allowable Span *Live Load 30 psf Ft. In.	*Live Load 40 psf Ft. In.
2 x 6	12	12'-5"	11'-5"
	16	11'-4"	10'-1"
	24	9'-2"	8'-3"
2 x 8	12	16'-1"	14'-9"
	16	14'-9"	13'-6"
	24	12'-4"	11'-0"
2 x 10	12	19'-11"	18'-3"
	16	18'-3"	16'-9"
	24	15'-7"	14'-0"
2 x 12	12	23'-9"	21'-9"
	16	21'-9"	19'-11"
	24	18'-11"	16'-11"
3 x 8	12	18'-7"	17'-0"
	16	17'-0"	15'-7"
	24	15'-1"	13'-10"
3 x 10	12	23'-1"	21'-1"
	16	21'-2"	19'-4"
	24	18'-8"	17'-1"

*Thirty pounds per square foot Live Load is for one-story dwellings. Forty pounds per square foot Live Load is for other occupancies having that requirement.

Use A 10# heavier Live Load where plastered ceilings are used.

1704.7 — CEILING JOISTS AND ROOF RAFTERS (Dwellings)

Table 1704.7 gives the allowable spans, according to spacings shown, for ceiling joists and roof rafters (light weight roofing), using Grade of Lumber based on twelve hundred (1200) pounds per sq. in. fiber stress. Deflection Limitation 1/360.

Ceiling joists and rafters of other grades or other sizes, or for other loads may be used, provided they are properly designed, in accordance with Section 1707.

The span of roof rafters shall be measured from plate to ridge, except that where rafters are braced to ceiling joists so that a complete truss is formed the span may be taken as the distance between the intersecting points of trussing.

TABLE 1704.7
MAXIMUM SPANS OF CEILING JOISTS AND ROOF RAFTERS

Size of Member (Nominal) Inches	Spacing of Members Center to Center Inches	Maximum Allowable Span Ceiling Joists Ft. In.	Roof Rafters (For Dwelling) Ft. In.
2 x 4	12	10'-5"	11'-5"
	16	9'-4"	9'-10"
	24	8'-3"	8'-0"
2 x 6	12	16'-1"	17'-7"
	16	14'-8"	15'-4"
	24	12'-10"	12'-5"
2 x 8	12	21'-6"	23'-6"
	16	19'-6"	20'-4"
	24	17'-0"	16'-7"
2 x 10	12	27'-2"	29'-10"
	16	24'-8"	25'-9"
	24	21'-7"	21'-1"

1704.8 — ROOF FRAMING AND SHEATHING

Roof framing and trussing shall be thoroughly and effectively braced. Roof joists or rafters, when supported on a ribbon board, shall be well nailed to the stud.

VALLEY RAFTERS — Valley rafters shall be not less than two by six (2x6) inches nominal size.

SHEATHING — Open sheathing shall be not less than one by four inch (1 x 4) nominal size, set not more than eight (8) inches on center and nailed with not less than two (2) 8d nails to each supporting rafter.

ROOF COVERING — Any roof covering permitted in this Code may be applied to dwellings. (See Chapter VII Fire Protection Requirements, Section 706, Roof Coverings). Whenever composition roofing is used, solid sheathing shall be applied.

FLASHING — Flashing shall be placed around openings and extensions of mechanical appliances or equipment through the roof.

1704.9 — ROOF JOISTS

Table 1704.9 gives the allowable spans of Roof Joists, based on f-1200 pounds per sq. in. Spans are based on a live load of 20 psf in accordance with Section 1203.2 plus supporting finished ceiling and 10 psf dead load for not supporting finished ceiling. Deflection is limited to 1/360 using 20 psf live load only. All Roof Joists shall be provided with cross bridging as set forth in Section 1704.5—Bridging.

TABLE 1704.9
MAXIMUM SPANS OF ROOF JOISTS

Joist Size (Nominal) Inches	Joist Spacing Center to Center Inches	Roof Joist Spans Supporting Finished Ceiling Ft. In.	Roof Joist Spans Not Supporting Finished Ceiling Ft. In.
2 x 4	12	7'-6"	9'-9"
	16	6'-10"	8'-5"
	24	5'-11"	6'-10"
2 x 6	12	14'-0"	15'-2"
	16	12'-2"	13'-1"
	24	9'-10"	10'-7"
2 x 8	12	18'-8"	20'-2"
	16	16'-2"	17'-5"
	24	13'-2"	14'-3"
2 x 10	12	23'-7"	25'-6"
	16	20'-5"	22'-1"
	24	16'-8"	18'-0"
2 x 12	12	28'-7"	30'-11"
	16	24'-9"	26'-9"
	24	20'-2"	21'-10"
3 x 8	12	22'-10"	25'-7"
	16	20'-6"	22'-2"
	24	16'-9"	18'-1"
3 x 10	12	29'-0"	32'-6"
	16	26'-0"	28'-1"
	24	21'-2"	22'-11"

1704.10 — SCUTTLES

All buildings shall have a scuttle or opening through the ceiling into the roof attic. Such opening shall be not less than two (2) feet by three (3) feet in dimensions. Scuttle openings shall be provided with a lid that does not require any special effort to remove or open.

SECTION 1705 — WALLS — EXTERIOR PROTECTION

1705.1 — FIRE-RESISTIVE RATING

Where fire-resistive walls are required, exterior wall construction shall conform to the requirements of Chapter X, Fire-Resistive Ratings.

1705.2 — SHEATHING

Sheathing shall be applied on the exterior walls of all Type VI buildings more than one story in height, except when back-plastered stucco construction is used.

Sheathing, where required for exterior walls, shall be applied solidly over the wall surface and shall be one or more of the following materials:

1. Wood not less than five-eighths inch (⅝) thick.
2. Fiber board not less than six-sixteenths (6/16) thick.
3. Gypsum not less than one-half inch (½) thick.
4. Plywood not less than five-sixteenths inch (5/16) thick.

1705.3 — WALL COVERINGS

Outer wall coverings of exterior walls shall be of the materials applied in the manner specified in this section.

(a) **Weatherboarding.** Wood siding when in place shall have an average thickness of not less than five-eighths inch (⅝). Siding of less than these dimensions may be applied, provided the outside face of the stud is covered with solid sheathing, as provided in this section.

(b) **Wood Shingles or Shakes.** Wood shingles or shakes attached to sheathings other than wood or plywood shall be secured with approved mechanically-bonding nails or by corrosive resisting common nails on shingle nailing boards securely nailed to each stud with two (2) 8d nails. Wood shingles or shakes may be applied over fiberboard shingle backer and fiberboard sheathing with approved corrosion resistive annular grooved nails. The minimum thickness of wood shingles or shakes between nailing boards shall be not less than three-eighth (⅜) inches.

(c) **Plywood.** Plywood shall be of the exterior type and shall have a minimum thickness of three-eighths (⅜) inches. All plywood

joints shall be backed solidly with nailing pieces not less than two (2) inches in width, unless wood or plywood sheathing is used, or joints are lapped horizontally, or otherwise made waterproof.

(d) **Asbestos Shingles.** Asbestos Shingles attached to sheathing other than wood or plywood shall be secured with approved mechanically-bonding nails or by corrosive resisting common nails on shingle nailing boards securely nailed to each stud with two (2) 8d nails. Asbestos shingles shall have a minimum thickness of five thirty-second (5/32) inches.

(e) **Masonry Veneer.** Masonry veneer shall conform to the requirements of Chapter XIV—Masonry and Veneered Walls. Brick Veneer (clay, sand lime or concrete) shall have a minimum thickness of two (2) inches for one story only and not less than four (4) inches for more than one story. Brick or other unit veneers shall be backed with solid sheathing covered with waterproof building paper except where the sheathing is water-repellant and is so labeled. Brick veneer shall be securely attached to the structure at intervals of not more than sixteen (16) inches vertically and thirty-two (32) inches horizontally with non-ferrous metal ties or galvanized 40d nails.

(f) **Other Veneers.** All veneers other than brick shall conform to the requirements of Chapter XIV Masonry and Veneered Walls.

(g) **Stucco.** Stucco or exterior plaster shall conform to requirements of Section 1807.

(h) **Metal.** Exterior wall coverings may be of formed metal not less than twenty-eight (28) U. S. Standard Gauge.

(i) **Solid Masonry.** Solid masonry walls shall conform to the requirements of Chapter XIV, Masonry and Veneered Walls.

SECTION 1706 — CONNECTIONS

1706.1 — GENERAL

All connections shall be such as to develop the full strength and rigidity of members connected. The provisions of this section shall apply.

1706.2 — SAFE LATERAL STRENGTH OF NAILS

TABLE 1706.2

SAFE LATERAL STRENGTH OF COMMON WIRE NAILS

Driven Perpendicular to the Grain of the Wood, in pounds per Nail

Kind of Wood	SIZE OF NAIL									
	6d	8d	10d	12d	16d	20d	30d	40d	50d	60d
Length of Nail	2"	2½"	3"	3¼"	3½"	4"	4½"	5"	5½"	6"
Southern Pine or Douglas Fir	63	78	94	94	107	139	154	176	202	223
Other Species	As determined by the Building Official									

1706.3 — SAFE RESISTANCE TO WITHDRAWAL

A wire nail driven perpendicular to the grain of the wood shall not be subjected to a greater load, tending to cause withdrawal, than the safe resistance of the nail to withdrawal, as set forth in Table 1706.3.

Nails driven parallel to the grain of the wood shall not be allowed for resisting computed tensile stresses.

TABLE 1706.3

SAFE RESISTANCE TO WITHDRAWAL OF COMMON WIRE NAILS

Driven Perpendicular to the Grain of the Wood, in Pounds per Linear Inch of Penetration into the Main Member

Kind of Wood	Size of Nail									
	6d	8d	10d	12d	16d	20d	30d	40d	50d	60d
Sou. Pine Longleaf	51	59	67	67	73	87	93	102	110	119
Southern Pine	42	48	55	55	60	71	76	83	90	97
Douglas Fir	29	34	38	38	42	49	53	58	63	68
Other Species	As determined by the Building Official									

1706.4 — SPACING AND PENETRATION OF NAILS

Nails shall not be driven closer together than one-half their length unless driven in bored holes nor closer to the edge of the timber than one-quarter their length. Holes for nails when necessary to prevent splitting shall be bored of diameter smaller than that of the nails. Nails shall be of such length that, when joining one timber to another, the penetration of the nail into the second or farther timber shall be not less than one-half the length of the nail.

1706.5 — WASHERS

All bolts in direct tension shall be provided with steel plate washers under heads and nuts. The area of these washers must be such that the unit bearing stress on the wood shall not exceed the allowable unit stress. The washer shall be not less in thickness than one-tenth the diameter or the length of the longer side of the washer.

Bolts taking shear only shall have Standard O. G. Malleable Iron washers, or equivalent, under head and nuts.

1706.6 — BOLTED JOINTS

Joints in which bolts are used to resist stresses in wood structures shall be designed in accordance with the principles set forth in the "National Design Specification for Stress-Grade Lumber and its

Fastenings—1960", of the National Lumber Manufacturers Association.

1706.7 — TIMBER CONNECTORS

Joints wherein timber connectors are used to transmit stresses between structural or load-bearing members shall be designed in accordance with the principles set forth in the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960", of the National Lumber Manufacturers Association.

SECTION 1707 — LUMBER STRUCTURAL DESIGN, QUALITY AND STRENGTH

1707.1 — ALLOWABLE UNIT STRESSES

(a) Stresses, in pounds per square inch, shall not exceed the allowable working stresses, except as herein modified, for the respective species and grades set out in the following Tables; provided, however, other stress grades may be approved, and stresses for species and grades not given in the following tables shall be established, by the Building Official, in accordance with the principles set forth in the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960" of the National Lumber Manufacturers Association.

(b) Stresses given in tables 1707 shall be used only when a selected species is identified by the grade mark of a lumber grading or inspection bureau or agency recognized as being competent.

(c) Stresses for joist and plank grades apply to material with the load applied to either the narrow or wide faces.

(d) When the duration of the full maximum load does not exceed the period indicated, the allowable unit stresses given in the tables for sawn lumber and in the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960" for glued laminated lumber shall be increased as follows:

15 per cent for 2 months duration, as for snow
25 per cent for 7 days duration.
33⅓ per cent for wind or earthquake
100 percent for impact.

Allowable unit stresses given in the tables may be used without regard to impact if the stress induced by impact does not exceed the allowable unit stress given therein. The foregoing increases are not cumulative. For combined durations of loading the resulting structural members shall not be smaller than required for a longer duration of loading. The foregoing increases apply to the modulus of elasticity when used to determine the allowable loads for columns and other members in compression parallel to grain, otherwise they do not apply thereto. These increases apply to mechanical fastenings except as otherwise provided.

Where a member is to be fully stressed to the maximum allowable stress for many years, either continuously or cumulatively under the condition of maximum design load, the allowable working stresses shall not exceed 90 per cent of those in the tables adjusted as otherwise provided. The provisions of this paragraph apply to modulus of elasticity when used to determine the allowable loads for columns or other members in compression parallel to grain, otherwise they do not apply thereto. They also apply to mechanical fastenings unless otherwise noted.

The allowable unit stresses given in the tables and the adjustments thereof apply to stress-grade lumber used under conditions continuously dry, as in most covered structures. When used under other conditions the provisions in the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960", therefore shall apply.

The allowable unit stresses and adjustments thereof apply to stress-grade lumber and glued laminated structural lumber that has been pressure impregnated by an approved process and preservative and to the heartwood of a durable species under dry conditions of use. They also apply thereto under other conditions of use except as provided in the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960".

(e) In computing shear all loads within a distance from either support equal to the depth of the beam may be neglected. All concentrated loads located at a distance from the support of one to three times the depth of the beam may be considered as placed at three times the depth of the beam from the support or at the quarter-point whichever is closer to the support. All other loads shall be considered in the usual manner.

(f) Shearing stress for joint details may be taken as fifty per cent (50%) greater than the horizontal shear values otherwise permitted.

In computing the horizontal shear in eccentric joints the depth of the member shall be assumed as reduced by the distance between the unloaded edge of the member and the nearest edge of the connector. Where bolts alone are used, the depth shall be reduced by the distance between the unloaded edge and the center of the bolt.

(g) In joists supported on a ribbon or ledger board and spiked to the studding, the allowable stress in compression perpendicular to the grain may be increased fifty per cent (50%).

(h) Allowable compression stresses perpendicular to grain may be increased in accordance with the following factors for bearings less than six (6) inches in length and located three (3) inches or more from the end of a timber:

Length of bearings (inches)	½	1	1½	2	3	4	6 or more
Factor	1.75	1.38	1.25	1.19	1.13	1.10	1.00

For stress under a washer or small plates the same factor may be taken as for a bearing, the length of which equals the diameter of the washer.

(i) Compression on surfaces inclined to grain shall be limited according to the following formula:

$$N = \frac{cq}{c \sin^2 \ominus + q \cos^2 \ominus}$$ in which,

N = Allowable unit stress on the inclined surface
c = unit stress in compression parallel to the grain
q = unit stress in compression perpendicular to the grain
$\ominus$ = angle in degrees between the direction of the load and the direction of the grain

1707.2 — TIMBER COLUMN FORMULA

(a) Simple solid wood columns consist of a single piece or pieces properly glued together to form a single member.

The safe load, in pounds per square inch, of net cross-sectional area for simple solid columns and other solid members of square or rectangular cross section stressed in compression parallel to the grain shall be determined by the following formula:

$$P/A = \frac{0.30\,E}{(l/d)^2}$$

but the maximum unit load (P/A) shall not exceed the allowable unit stress in compression parallel to grain "c" as set forth in the tables adjusted as otherwise provided.

Simple solid columns shall be limited in maximum length to $l/d = 50$.

A = area in square inches of net cross-section.
d = least dimension, of columns, in inches.
E = modulus of elasticity, "E", in tables adjusted as provided.
l = laterally unsupported length of column, in inches.
P = total load, in pounds.
P/A = maximum axial load, in pounds per square inch.

(b) **Spaced Member Columns.** Columns formed of two or more individual members separated by blocking at the ends and middle points of their length and joined at the ends by approved timber connectors shall be designed in accordance with the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960".

The individual members of spaced columns shall be limited in maximum length to $l/d = 80$.

(c) **Round Columns.** The allowable load for a column of round cross-section shall not exceed that permitted for a square column of the same cross-sectional area.

(d) **Built-Up Columns.** Built-up columns composed of two or more members spiked or bolted together shall be designed in accordance with the principles set forth in the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960".

1707.3 — STRUCTURAL GLUED-LAMINATED LUMBER

Structural glued laminated members shall be designed and fabricated in accordance with the "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960".

TABLE 1707 — ALLOWABLE UNIT STRESSES FOR STRESS GRADE LUMBER

The allowable stresses in the table are for normal loading duration.

In the Table.

f = extreme fiber in bending
t = tension parallel to grain
H = horizontal shear
ci = compression perpendicular to grain
c = compression parallel to grain
E = modulus of elasticity

Species and commercial grade		Rules under which graded	Allowable unit stresses in pounds per square inch				
			"f" and "t"	H	ci	c	E
CEDAR, INCENSE							
Select Dex	Decking	West Coast Lumber Inspection Bureau	1,100	.....	305	.....	990,000
Commercial Dex	Decking		850	.....	305	.....	990,000
CEDAR, WESTERN RED							
Select Dex	Decking		900	.....	240	.....	1,100,000
Commercial Dex	Decking		700	.....	240	.....	1,100,000
DOUGLAS FIR, COAST REGION							
Dense Select Structural	L.F.		2,050	120	455	1,500	1,760,000
Select Structural	L.F.		1,900	120	415	1,400	1,760,000
1500 f Industrial	L.F.		1,500	120	390	1,200	1,760,000
1200 f Industrial	L.F.		1,200	95	390	1,000	1,760,000
Dense Select Structural	J.&P.		2,050	120	455	1,650	1,760,000
Select Structural	J.&P.		1,900	120	415	1,500	1,760,000
Dense Construction	J.&P.		1,750	120	455	1,400	1,760,000
Construction	J.&P.		1,500	120	390	1,200	1,760,000
Standard	J.&P.	West Coast Lumber Inspection Bureau	1,200	95	390	1,000	1,760,000
Dense Select Structural	B.&S.		2,050	120	455	1,500	1,760,000
Select Structural	B.&S.		1,900	120	415	1,400	1,760,000
Dense Construction	B.&S.		1,750	120	455	1,200	1,760,000
Construction	B.&S.		1,500	120	390	1,000	1,760,000
Dense Select Structural	P.&T.		1,900	120	455	1,650	1,760,000
Select Structural	P.&T.		1,750	120	415	1,500	1,760,000
Dense Construction	P.&T.		1,500	120	455	1,400	1,760,000
Construction	P.&T.		1,200	120	390	1,200	1,760,000
Select Dex	Decking		1,500	.....	390	.....	1,760,000
Commercial Dex	Decking		1,200	.....	390	.....	1,760,000
DOUGLAS FIR							
Dense Select Structural	J.&P.		2,050	120	455	1,650	1,760,000
Select Structural	J.&P.		1,900	120	415	1,500	1,760,000
Dense Structural	J.&P.		1,750	120	455	1,400	1,760,000
Structural	J.&P.		1,500	120	390	1,200	1,760,000
Standard Structural	J.&P.	Western Pine Association	1,200	95	390	1,000	1,760,000
Dense Select Structural	P.&T.		1,900	120	455	1,650	1,760,000
Select Structural	P.&T.		1,750	120	415	1,500	1,760,000
Dense Structural	P.&T.		1,500	120	455	1,400	1,760,000
Structural	P.&T.		1,200	120	390	1,200	1,760,000

TABLE 1707 — ALLOWABLE UNIT STRESSES FOR STRESS GRADE LUMBER (Continued)

Species and commercial grade		Rules under which graded	Allowable unit stresses in pounds per square inch "f" and "t"	H	ci	c	E
FIR, WHITE							
Select Dex	Decking	West Coast Lumber Inspection Bureau	1,100	.....	365	.....	1,210,000
Commercial Dex	Decking		850	.....	365	.....	1,210,000
HEMLOCK, EASTERN							
Select Structural	J.&P.—B.&S.	Northern Hemlock and Hardwood Manufacturers Association	1,300	85	360	850	1,210,000
Prime Structural	J.&P.		1,200	60	360	775	1,210,000
Common Structural	J.&P.		1,100	60	360	650	1,210,000
Utility Structural	J.&P.		950	60	360	600	1,210,000
Select Structural	P.&T.		.....	.....	360	850	1,210,000
HEMLOCK, WEST COAST							
Select Structural	L.F.	West Coast Lumber Inspection Bureau	1,600	100	365	1,100	1,540,000
1500 f Industrial	L.F.		1,500	100	365	1,000	1,540,000
1200 f Industrial	L.F.		1,200	80	365	900	1,540,000
Select Structural	J.&P.		1,600	100	365	1,200	1,540,000
Construction	J.&P.		1,500	100	365	1,100	1,540,000
Standard	J.&P.		1,200	80	365	1,000	1,540,000
Construction	B.&S.		1,500	100	365	1,000	1,540,000
Construction	P.&T.		1,200	100	365	1,100	1,540,000
HEMLOCK, WEST COAST							
Select Dex	Decking	West Coast Lumber Inspection Bureau	1,300	.....	365	.....	1,540,000
Commercial Dex	Decking		1,000	.....	365	.....	1,540,000
LARCH							
Dense Select Structural	J.&P.	Western Pine Association	2,050	120	455	1,650	1,760,000
Select Structural	J.&P.		1,900	120	390	1,500	1,760,000
Dense Structural	J.&P.		1,750	120	455	1,400	1,760,000
Structural	J.&P.		1,500	120	390	1,200	1,760,000
Standard Structural	J.&P.		1,200	95	390	1,000	1,760,000
Dense Select Structural	P.&T.		1,900	120	455	1,650	1,760,000
Select Structural	P.&T.		1,750	120	390	1,500	1,760,000
Dense Structural	P.&T.		1,500	120	455	1,400	1,760,000
Structural	P.&T.		1,200	120	390	1,200	1,760,000
PINE, SOUTHERN							
Dense Structural 86 KD	2" thick only	Southern Pine Inspection Bureau	3,000	165	455	2,250	1,760,000
Dense Structural 72 KD	"		2,500	150	455	1,950	1,760,000
Dense Structural 65 KD	"		2,250	135	455	1,800	1,760,000
Dense Structural 58 KD	"		2,050	120	455	1,650	1,760,000
No. 1 Dense KD	"		2,050	135	455	1,750	1,760,000
No. 1 KD	"		1,750	135	390	1,500	1,760,000
No. 2 Dense KD	"		1,750	120	455	1,300	1,760,000
No. 2 KD	"		1,500	120	390	1,100	1,760,000
Dense Structural 86	"		2,900	150	455	2,200	1,760,000
Dense Structural 72	"		2,350	135	455	1,800	1,760,000
Dense Structural 65	"		2,050	120	455	1,600	1,760,000
Dense Structural 58	"		1,750	105	455	1,450	1,760,000
No. 1 Dense	"		1,750	120	455	1,550	1,760,000
No. 1	"		1,500	120	390	1,350	1,760,000
No. 2 Dense	"		1,400	105	455	1,050	1,760,000
No. 2	"		1,200	105	390	900	1,760,000
Dense Structural 86	3" & 4" thick		2,900	150	455	2,200	1,760,000
Dense Structural 72	"		2,350	135	455	1,800	1,760,000
Dense Structural 65	"		2,050	120	455	1,600	1,760,000

TABLE 1707 — ALLOWABLE UNIT STRESSES FOR STRESS GRADE LUMBER (Continued)

Species and commercial grade		Rules under which graded	Allowable unit stresses in pounds per square inch "f" and "t"	H	ci	c	E
Dense Structural 58	3" & 4" thick		1,750	105	455	1,450	1,760,000
No. 1 Dense SR	"		1,750	120	455	1,750	1,760,000
No. 1 SR	"		1,500	120	390	1,500	1,760,000
No. 2 Dense SR	"		1,400	105	455	1,050	1,760,000
No. 2 SR	"		1,200	105	390	900	1,760,000
Dense Structural 86	5" thick & up		2,400	150	455	1,800	1,760,000
Dense Structural 72	"		2,000	135	455	1,550	1,760,000
Dense Structural 65	"		1,800	120	455	1,400	1,760,000
Dense Structural 58	"		1,600	105	455	1,300	1,760,000
No. 1 Dense SR	"	Southern	1,600	120	455	1,500	1,760,000
No. 1 SR	"	Pine	1,400	120	390	1,300	1,760,000
No. 2 Dense SR	"	Inspection	1,400	105	455	1,050	1,760,000
No. 2 SR	"	Bureau	1,200	105	390	900	1,760,000
Industrial 86 KD	1", 1¼" and		2,600	165	390	1,950	1,760,000
Industrial 72 KD	1½" thick		2,200	150	390	1,650	1,760,000
Industrial 65 KD			2,000	135	390	1,550	1,760,000
Industrial 58 KD	"		1,750	120	390	1,400	1,760,000
Industrial 50 KD	"		1,500	120	390	1,100	1,760,000
Industrial 86	"		2,500	150	390	1,900	1,760,000
Industrial 72	"		2,000	135	390	1,550	1,760,000
Industrial 65	"		1,750	120	390	1,350	1,760,000
Industrial 58	"		1,500	105	390	1,250	1,760,000
Industrial 50	"		1,200	105	390	900	1,760,000
Select	Decking		1,750	120	390	1,350	1,760,000
Select No. 1	Decking		1,200	105	390	900	1,760,000
No. 2	Decking		1,200	105	390	900	1,760,000
PINE, NORWAY							
Prime Structural	J.&P.	Northern	1,200	75	360	900	1,320,000
Common Structural	J.&P.	Hemlock and	1,100	75	360	775	1,320,000
Utility Structural	J.&P.	Hardwood Manuafcturers Association	950	75	360	650	1,320,000
REDWOOD							
Dense Structural	J.&P.—B.&S.	California	1,700	110	320	1,450	1,320,000
Heart Structural	J.&P.—B.&S.	Redwood	1,300	95	320	1,100	1,320,000
Dense Structural	P.&T.	Association	-----	-----	320	1,450	1,320,000
Heart Structural	P.&T.		-----	-----	320	1,100	1,320,000
SPRUCE, EASTERN							
1450 f Structural Grade	J.&P.	Northeastern	1,450	110	300	1,050	1,320,000
1300 f Structural Grade	J.&P.	Lumber	1,300	95	300	975	1,320,000
1200 f Structural Grade	J.&P.	Manufacturers Assn., Inc.	1,200	95	300	900	1,320,000
SPRUCE, SITKA							
Select Dex	Decking	West Coast	1,100	-----	305	-----	1,320,000
Commercal Dex	Decking	Lumber Inspection Bureau	850	-----	305	-----	1,320,000

For other species and grades see "National Design Specification for Stress-Grade Lumber and Its Fastenings—1960".

SECTION 1708 — PLYWOOD

1708.1 — DEFINITION

Plywood is a cross-bonded assembly made of layers of veneer or veneer in combination with a lumber core or plies joined with an adhesive.

1708.2 — IDENTIFICATION

All plywood when used structurally (including among others, use for siding, roof and wall sheathing, subflooring, diaphragms, and built-up beams) shall conform to the performance standards for its type in Commercial Standard CS45-55 for Douglas fir plywood. It shall be identified as to species, grade and glue type by an approved agency by means of appropriate grademarks on each panel and shall further meet all requirements of the applicable U. S. Commercial Standard. In addition to the above requirements, all plywood when permanently exposed in outdoor applications shall be of Exterior type.

1708.3 — WORKMANSHIP

Preparation, fabrication, and installation of plywood for structural uses, its supporting members, glues and mechanical devices for fastening thereof shall conform to good engineering practices, so as to develop the strength and rigidity necessary for the purposes for which they are intended.

1708.4 — ALLOWABLE WORKING STRESSES FOR PLYWOOD (Douglas Fir)

Working stresses for Douglas fir plywood shall not exceed values given in Table 1708.4, and for plywood other than Douglas fir shall be determined by the basic stresses for that species.

TABLE 1708.4

WORKING STRESSES FOR PLYWOOD (DOUGLAS FIR)

(For grades and thicknesses listed in US CS45-55)

In Bending, Tension and Compression (except bearing and 45° stresses) consider only those plies with their grain direction // to the principal stress.

DRY LOCATION

TYPE OF STRESS	EXT-DFPA-A-A	EXT-DFPA-A-B EXT-DFPA-Physhield * (A-C)	EXT-DFPA-Utility-(B-C) EXT-DFPA-Sheathing-(C-C) EXT-DFPA-Concrete Form-(B-B) Plyform-(B-B) Plyscord-(C-D)	Interior-A-A Interior-A-B Plypanel-(A-D) Plybase-(B-D) Note: Apply the following percentages to the stresses for the corresponding Exterior grade. See example at bottom of page.
EXTREME FIBER in bending				
Face grain // to span	2,188	2,000	1,875	100%
Face grain ⊥ to span	1,875	1,875	1,875	80%
TENSION				
// to face grain (3-ply only*)	2,188	2,000	1,875	100%***
⊥ to face grain	1,875	1,875	1,875	80%
± 45° to face grain	337	320	310	85%
COMPRESSION				
// to face grain (3-ply only*)	1,605	1,460	1,375	100%***
⊥ to face grain	1,375	1,375	1,375	70%
± 45° to face grain	496	472	460	80%
BEARING (on face)	405	405	405	100%
SHEAR, rolling, in plane of plies**	79	72	68	75%
// or ⊥ to face grain ±45°	106	96	90	75%
SHEAR, in plane ⊥ to plies**	210	192	180	85%
// or ⊥ to face grain ± 45°	420	384	360	85%
MODULUS OF ELASTICITY in bending				
Face grain // to span	1,600,000	1,600,000	1,600,000	100%
Face grain ⊥ to span	1,600,000	1,600,000	1,600,000	70%

TABLE 1708.4

WORKING STRESSES FOR PLYWOOD (DOUGLAS FIR)

(For grades and thicknesses listed in US CS45-55)
(Continued)

*For tension or compression, // to grain, in 5-ply or thicker, use values for 3-ply, but in next lower grade.

**For certain conditions where stress concentrations exist these working stresses for rolling shear should be reduced by 50%. See Table 1, F.P.L. Bulletin, "Approximate Methods of Calculating Strength of Plywood."

***For 5 or more plies use 90%.

WET OR DAMP LOCATION

Where moisture content will exceed 16%, decrease by 20% values shown for Dry Location for following properties:

Extreme fiber in bending, tension and compression both // and ⊥ to the grain and at 45°, and bearing. (No change in values for shear or modulus of elasticity.)

Example: The working stress in compression // for Plypanel 5-ply (1238 psi) is found by multiplying the value for EXT-DFPA-Plyshield 5-ply, 1375 psi, by 90%, the reduction factor shown in the last column and footnotes * and ***.

1708.5 — CONDITIONS OF SERVICE

Where exposure is such that moisture content will exceed 16%, reduce working stresses according to footnotes of Table 1708.4.

When duration of the full maximum load does not exceed the period indicated, increase the allowable unit stresses in Table 1708.4 as follows:

15% for 2 months duration.
25% for 7 day duration.
33-1/3% for wind.
100% for impact.

Allowable unit stresses given in Table 1708.4 for long-time loading conditions may be used without regard to impact if the stress induced by impact does not exceed the allowable unit stress for long-time loading.

1708.6 — ALLOWABLE UNIT STRESSES ON PLANS

Where plywood is used structurally the allowable unit stress or the species and grade shall be shown on the plans filed with the building department.

1708.7 — EXTERIOR WALL COVERINGS

Where plywood is used for covering the exterior of outside walls it shall be of the Exterior type, not less than ⅜" thick. Panel joints shall be backed solidly by studs or by nailing pieces not less than 2 inches wide except over sheathing or where applied as lapped siding or otherwise made waterproof to the satisfaction of the Building Official. Nailing of plywood shall be as indicated in Table 1708.7.

TABLE 1708.7

	Plywood Thickness	Nail Size	Nail Type	Nail-Spacing on Supports* Panel Edges	Intermediate
Panel Siding	⅜"	6d	Non-corrosive, box or casing nails	6"	12" on each stud
	½" & Thicker	8d		6"	12" on each stud
Lap Siding	⅜"	6d	Non-corrosive, box or casing nails	One nail per stud on bottom edge. Space not more than 4" at vertical joints. If siding is wider than 12", space nails on each intermediate stud not more than 8".	
	½" & Thicker	8d			
Texture 1-11**	⅝"	8d	Galv. casing nails	4"	8" on each stud

*Minimum edge distance of ⅜".

**Special Requirement: Nails on ship-lap edges ½" from exposed edge and slant driven towards it; do not set.

1708.8 — PLYWOOD SUBFLOORING

Where used as structural subflooring, plywood shall be of maximum spans as indicated below:

TABLE 1708.8 (a)

MAXIMUM SPANS FOR DOUGLAS FIR PLYWOOD SUBFLOORING

(Face Grain Perpendicular to Supports)

Plywood Thickness	Max. Spacing of Supports, c. to c., inches 40 p.s.f.	50 p.s.f.	100 p.s.f.
½" rough (1)	16"	16"	16"
⅝" (1)	20"	20"	20"
¾" (1)	24"	24"	24"

(1) Blocking installed at edges, unless twenty-five thirty-seconds-inch (25/32") wood strip finish floor is used. If wood strips are perpendicular to supports, one-half inch (½") can be used on twenty-four inch (24") span.

TABLE 1708.8 (b)
MAXIMUM SPANS FOR WESTERN SOFTWOOD PLYWOOD* SUBFLOORING

(Face Grain Perpendicular to Supports)

Plywood Thickness	Max. Spacing of Supports, c. to c., inches 40 p.s.f.	50 p.s.f.	100 p.s.f.
5/8" (1)	16"	16"	16"
3/4" (1)	24"	24"	24"

(1) Blocking installed at edges, unless 25/32" wood strip finish floor is used. If wood strips are perpendicular to supports, 5/8" can be used on 24" span.

*Western hemlock, white fir and noble fir manufactured in accordance with U. S. CS122.

1708.9 — NAILING

Where plywood subflooring is used it shall be nailed to joists according to the following schedule or equal.

Plywood Thickness	Nail Size	Nail Type	Nail Spacing on Supports Panel Edges	Intermediate
1/2"	6d	Common	6"	10"
5/8", 3/4"	8d	Common	6"	10"
1"	10d	Common	6"	6"

1708.10 — PLYWOOD ROOF SHEATHING

Where used as structural roof sheathing plywood shall be of minimum thickness set forth in Tables 1708.10 and 1708.11 which follow: Plywood roof sheathing shall be nailed in accordance with the provisions of paragraph 1708.12 (a) for sidewall sheathing.

TABLE 1708.10
MAXIMUM SPANS FOR DOUGLAS FIR PLYWOOD ROOF SHEATHING

(Plywood continuous over two or more spans; and face grain perpendicular to supports)

Plywood Thickness	Max. Plywood Spans, c. to c., inches 20 p.s.f.	30 p.s.f.	40 p.s.f.
5/16" rough	20 (1)	20	20
3/8" rough	24 (1)	24	24
1/2" rough (2)	32 (1)	32	30
5/8" rough (2)	42 (1)	42	39
3/4" (2)	48 (1)	47	42

(1) These spans shall not be exceeded under any load condition.

(2) Provide adequate blocking or suitable edge support when span exceeds 28 inches for one-half inch; 32 inches for five-eighths inch; and 36 inches for three-fourths inch.

NOTE: For special case of two span continuous beams, plywood spans may be increased 6½%, except as noted under (1).

TABLE 1708.11

MAXIMUM SPANS FOR WESTERN SOFTWOOD PLYWOOD* ROOF SHEATHING

(Plywood continuous over two or more spans; and face grain perpendicular to supports)

Plywood Thickness	Max. Plywood Spans, c. to c., inches		
	20 p.s.f.	30 p.s.f.	40 p.s.f.
5/16" rough	16(1)	16	16
3/8" rough	20(1)	20	20
1/2" rough(2)	26(1)	26	26
5/8" rough(2)	35(1)	35	34
3/4"(2)	40(1)	40	37

*Western hemlock, white fir and noble fir manufactured in accordance with U. S. CS122.

(1) These spans shall not be exceeded under any load condition.

(2) Provide blocking or other suitable edge support when span exceeds 24" for 1/2"; 28" for 5/8"; and 32" for 3/4".

NOTE: For special case of two span continuous beams, plywood spans may be increased 6 1/2%, except as noted under (1).

Plywood roof sheathing, unless of the Exterior type, shall have no surface or edge exposed to the weather.

1708.12 (a) — SIDEWALL SHEATHING

Plywood sidewall sheathing shall be not less than 5/16" in thickness.

Angle bracing of plywood sheathed frame walls may be omitted when the plywood nailing is at least equal to the following schedule:

Plywood Thickness	Nail Size	Nail Type	Nail Spacing on Supports	
			Panel Edges	Intermediate
5/16", 3/8"	6d	common	6"	12"
1/2", 5/8"	8d	common	6"	12"

(b) — Application

Plywood sheathing panels not less than 48" wide and 96" long may be applied either horizontally or vertically.

(c) — Sheathing Paper

Sheathing paper may be omitted over plywood sheathing except behind exterior stucco finish, brick veneer, and exterior wall coverings which permit the passage of water.

SECTION 1709 — PLYWOOD DIAPHRAGMS

1709.1 — GENERAL

Plywood diaphragms may be used to resist horizontal forces in horizontal and vertical distributing or resisting elements, provided the deflection in the plane of the diaphragm, as determined by calcula-

tions, tests or analogies drawn therefrom, does not exceed the permissible deflection of attached distributing or resisting elements.

Permissible deflection shall be that deflection up to which the diaphragm and any attached distributing or resisting element will maintain its structural integrity under assumed load conditions, i.e., continue to support assumed loads without danger to occupants of the structure.

Connections and anchorages capable of resisting the design forces shall be provided between the diaphragms and the resisting elements. Openings in diaphragms which materially affect their strength shall be fully detailed on the plans, and shall have their edges adequately reinforced to transfer all shearing stresses.

Size and shape of diaphragms shall be limited as set forth in Table 1709.1. In buildings of wood construction where rotation is provided for, transverse shear resisting elements normal to the longitudinal element shall be provided at spacings not exceeding 2 times the width for plywood diaphragms. In masonry or concrete buildings plywood diaphragms shall not be considered as transmitting lateral forces by rotation.

TABLE 1709.1

MAXIMUM DIAPHRAGM DIMENSION RATIOS

Type	Horizontal Diaphragms Maximum Span-Width Ratios	Vertical Diaphragms Maximum Height-Width Ratios
Plywood, nailed all edges	4:1	3½:1
Plywood, blocking omitted at intermediate joints	4:1	2:1

1709.2 — DESIGN

Horizontal and vertical diaphragms sheathed with plywood may be used to resist horizontal forces not exceeding those set forth in Table 1709.2, or may be calculated by principles of mechanics without limitations by using values for nail strength and plywood shear strength given elsewhere in this code. Plywood thickness for horizontal diaphragms shall not be less than that set forth in Tables 1708.8(a) and 1708.10 for corresponding joist spacing and loads, except that one-fourth inch (¼") may be used where perpendicular loads permit.

All boundary members shall be proportioned and spliced where necessary to transmit direct stresses. Framing members shall be at least one and five-eighths inch (1⅝") wide. In general panel edges shall bear on the framing members and butt along their center lines.

Nails shall be placed not less than three-eighths inch (⅜") in from the panel edge, not more than twelve inches (12") apart along intermediate supports and six inches (6") along panel edge-bearings, and shall be firmly driven into the framing members. No unblocked panel less than twelve inches (12") wide shall be used.

When blocking is omitted and the panels are arranged so that load is applied perpendicular to the unblocked edges and to the continuous panel joints, shears shall not exceed two-thirds of the values given for six inch (6") nail spacing in Table 1709.2. For other panel arrangements shears shall not exceed one-half of the tabulated values for six inch (6") nail spacing.

For flat or low-pitched roofs, including bowstring trussed roofs, not intended for walking traffic, blocking may be omitted with 5/16" plywood on rafters spaced 20" or less, with ⅜" plywood on rafters spaced 24" or less, and with ⅝" plywood on rafters spaced 32" or less.

TABLE 1709.2

ALLOWABLE SHEAR FOR WIND ON BLOCKED DOUGLAS FIR PLYWOOD DIAPHRAGMS

(Pounds per Foot)

Minimum Plywood* Thickness	Common Nail Size	Nail Spacing on all Plywood Panel Edges† For Framing Member 2⅝ Inches or More in Width			For Framing Member Less than 2⅝ Inches but not Less than 1⅝ Inches in Width		
		6"	4"	3"	6"	4"	3"
5/16"**	6d	280	420	475	250	375	420
⅜"	8d	400	600	675	360	530	600
½"	10d	480	720	820	425	640	730

NOTE: For Douglas Fir and Southern Pine Framing (For other species adjust values accordingly).

†NOTE: When the force acting along either boundary or any line of continuous panel joints exceeds three-fourths of the tabulated value, nail spacing along such boundary or line shall be reduced by one-third.

*For Douglas fir plywood grades having inner plies of species other than Douglas fir use next greater thickness or reduce shears one-fourth.

**These values may be used with ¼" plywood where perpendicular loads permit its use.

1709.3 — GLUED CONSTRUCTION

Glued built-up plywood structural members shall be designed by applicable engineering formulas without exceeding allowable unit stresses specified in Table 1708.4.

1709.4 — FABRICATION

Structural glued plywood members shall be fabricated in accordance with good practice, and all work shall be under the supervision of qualified personnel.

1709.5 — MOISTURE CONTENT

The maximum moisture content of wood and plywood members shall not exceed 16% and shall not be less than 7% at the time of gluing.

1709.6 — SURFACES

Surfaces to be glued shall be free from dust, dirt and grease. Members shall be smoothly surfaced and be uniform in thickness for a maximum allowable tolerance of 1/64". Lumber surfaces shall not be sanded before gluing except that factory sanded plywood shall not be prohibited.

1709.7 — ADHESIVES

General. — Adhesives shall cover the entire contact area between structural elements of the member. Adhesives shall provide an adequate bond, shall subject the wood to no deleterious chemical reaction, and shall withstand without deterioration the expected conditions of service.

1709.8 — QUALITY

Adhesives will be of a type and quality approved by the Building Official. Where sufficient evidence of the quality of the adhesive to be used is not available, the Building Official may require test to be made.

1709.9 — USE

Interior type adhesives may be used only in interior and protected locations where moisture content of the wood will not exceed 16%.

Exterior type adhesives may be used under any condition of exposure and shall be used where subjected to high humidity.

Adhesive Application. — Gluing practices shall take into consideration the characteristics and limitations of the specific adhesive used and shall conform to good practice as to preparation of the wood and plywood surfaces for gluing, control of the temperature and moisture content of the material, maintenance of adequate pressures and compatibility of the adhesive with any other wood treatments employed; mixing, spreading, storage life, pot life, working life and assembly time life shall be in accordance with the recommendations of the manufacturer of the adhesive used.

1709.10 — TEMPORARY FENCES

Plywood ¼" thick properly supported shall be accepted as temporary fencing during construction.

SECTION 1710 — GYPSUM WALLBOARD FINISHES

Gypsum wallboard finishes shall be in accordance with the applicable provisions of American Standard Specifications for Gypsum Wallboard Finishes—ASA A97.1-1958.

CHAPTER XVIII

LATHING AND PLASTERING

SECTION 1800 — GENERAL

1801 — SCOPE

Lathing and plastering shall be done in the manner and with the materials specified in this Chapter, and when required for fire protection shall also comply with the provisions of Chapter X.

No plaster shall be applied until the lathing has been inspected and approved by the Building Official.

The Building Official may require that test holes be made in the wall for the purpose of determining the thickness and/or proportioning of the plaster, provided the permit holder has been notified 24 hours in advance of the time of making such tests.

SECTION 1802 — MATERIALS

Materials	Designation
Aggregate	
Sand—Shall be washed and when used with portland cement for scratch coat plastering the amount of sand retained on a No. 8 sieve shall be not less than 10% or more than 30%.	ASTM C 35-59
Perlite	ASTM C 35-54T
Vermiculite	ASTM C 35-54T
Gypsum Plasters	ASTM C 28-59
Lime—Special Finishing Hydrated Lime (Autoclaved)	ASTM C206-49
Quicklime for structural purposes (Lime putty shall be made from quicklime or hydrated lime and shall be prepared in an approved manner.)	ASTM C 5-59
Keene's Cement	ASTM C 61-50

Materials	Designation
Portland Cement	
Type I, II, or III	ASTM C 150-59
Type I-A, II-A, or III-A.	ASTM C 175-59
EXCEPTION: Approved types of plasticizing agents may be added to portland cement Type I or Type II in the manufacturing process, but not in excess of 12 per cent of the total volume. Plastic or water-proofed cements so manufactured shall meet the requirements for portland cement as specified in ASTM C150-53 except in respect to the limitations on insoluble residue, air-entrainment, and additions subsequent to calcination.	
Wood Lath	No. 1 Grade ASA-A42.4-1955
Fiber Insulation Lath	ASA-A42.4-1955
Gypsum Lath	ASTM C37-54
Metal and Wire Lath, Metal Accessories and Channels	ASA-A42.4-1955

SECTION 1803 — INTERIOR PLASTERING — LATHING

For gypsum, wood and fiber insulation laths, the distance between supports shall conform to the requirements set forth in Table No. 1803.1.

The weight of metal and wire lath and the spacing of supports shall conform to the requirements set forth in 1803.2.

Cornerite shall be provided at all interior angles except where metal or wire lath is carried around such intersections. Cornerite shall be nailed lightly or stapled to the lath (not to the framing members). Where corner bead is used it shall be similarly fastened.

No interior lath shall be applied until all exterior framing is covered.

TABLE 1803.1 — TYPE OF LATH — MAXIMUM SPACING OF SUPPORTS — METHOD OF ATTACHMENT

Type of Lath	Maximum Spacing of Wood Supports		Size and Type of Attachment	Maximum Spacing of Nails	Maximum Spacing of Metal Supports	
	Vertical Surfaces	Horizontal Surfaces			Vertical Surfaces	Horizontal Surfaces
⅜" perf. gypsum lath	16	16	1-⅛" 13 ga. 19/64" dia. head blued nail[1]	5"	16	16*
⅜" plain gypsum lath	16	16	Do[1]	5"	16	16
½" perf. gypsum lath	16	16	1-¼" 13 ga. 19/64" dia. head blued nail[1]	5"	16	16
½" plain gypsum lath	24	24	Do[1]	4"	24	16
Wood lath	16	16	3d fine 16 ga. blued nails	....	....	....
½" fiber insulation lath	16	16	1-⅛" fiberboard nails or 4d box nails[2]	4-½"	....	....
1" fiber insulation lath	16	16	1-¾" fiberboard nails or 6d box nails[2]	4-½"	....	....

TABLE 1803.1 — TYPE OF LATH — MAXIMUM SPACING OF SUPPORTS — METHOD OF ATTACHMENT (Continued)

Type of Lath	Maximum Spacing of Wood Supports		Size and Type of Attachment	Maximum Spacing of Nails	Maximum Spacing of Metal Supports
	Vertical Surfaces	Horizontal Surfaces			Vertical Surfaces / Horizontal Surfaces
Metal and wire lath	See Tab. No. 1803.2	.....	4d common nails[3] (Bent over)	6"	See Tab. 1803.2
Metal and wire lath	.....	See Tab. No. 1803.2	1-½" 11 ga. 7/16" dia. head barbed nails [3]	6"	See Tab. 1803.2

*16" spacing for clips giving continuous support to lath.

Notes: [1]Gypsum lath shall be applied to wood supports with joints broken in each course except that end joints may fall on one support when stripped with three inches (3") of metal lath or wire lath. Joints between walls and ceilings shall be staggered. Lath shall be butted together. Lath shall be secured to supports by means of approved clips or nails.

[2]End joints of fiber insulation lath, except in interlocking type lath, shall be not less than three-sixteenths inch (3/16") wide. Shiplapped, tongued and grooved or interlocking edges shall be fitted to moderate contact.

[3]Metal and wire lath shall be lapped at least one mesh at side and ends, but need not exceed one inch (1"). Metal and wire lath shall be attached to horizontal and vertical metal supports at not to exceed six-inch (6") spacing with not less than No. 18 U. S. Steel wire gage, galvanized annealed wire ties, or an approved equivalent attachment.

TABLE 1803.2 — WEIGHTS OF METAL AND WIRE LATH

Weight (Lbs. per sq. yd.)	Type of Lath	Maximum Spacing of Supports For Walls	For Ceilings
2.5	Flat Expanded metal lath	16"	0"
3.4	Flat Expanded metal lath	16"	16"
2.75	Flat Rib metal lath	16"	16"
3.4	Flat Rib metal lath	19"	19"
3.4	3/8" Rib metal lath*	24"	24"
4.5	Sheet metal lath	24"	24"
2.48	Wire lath	16"	12"
**	Wire fabric	16"	16"

*Rod-stiffened or V-stiffened flat expanded metal lath of equal rigidity and weight is permissible on the same spacing as 3/8-inch rib metal lath.

**Paper-backed wire fabric, No. 16 gauge wire, 2" x 2" mesh, with stiffener.

SECTION 1804 — INTERIOR PLASTERING

Lath and Plaster Partitions. Hollow partitions of lath and plaster shall have a plaster shell thickness of not less than three-fourths inch (¾").

The weight of metal and wire lath and the spacing of supports shall conform to the requirements set forth in Table No. 1803.2. Gypsum lath shall be not less than three-eights (⅜") in thickness. The minimum thickness of solid partitions of lath and plaster shall be not less than two inches (2") nor one eighty-fourth of the distance between supports. Studless solid partitions of metal lath and plaster or gypsum lath and plaster shall be not more than twelve feet (12') in height.

SECTION 1805 — SUSPENDED AND FURRED CEILINGS

The main runners and cross furring shall be not less than the sizes set forth in Table 1805.1.

Hangers for suspended and furred ceilings shall be not less than the sizes set forth in Table 1805.1, fastened to or embedded in the structural framing, masonry or concrete.

Hangers shall be saddle tied or wrapped around main runners so as to develop the full strength of the hangers. Lower ends of flat

hangers shall be bolted with three-eighths inch (⅜") bolts to runner channels, or bent tightly around runners and bolted to the main part of the hanger.

Cross furring shall be securely attached to main runners by (1) saddle tied with double No. 16 U. S. Steel wire gage galvanized wire, (2) with approved spiral clips or (3) approved equivalent attachments.

TABLE 1805.1 — SUSPENDED AND FURRED CEILINGS

Minimum Sizes for Wire and Rigid Hangers[1].

Minimum Sizes and Maximum Spans for Main Runners.

Minimum Sizes and Maximum Spans for Cross Furring.

HANGERS FOR SUSPENDED CEILINGS

Maximum Area Supported	Size and Type
12.5 sq. ft.	9 gage wire
16 sq. ft.	8 gage wire
18 sq. ft.	3/16" diameter, mild steel rod[2]
20 sq. ft.	7/32" diameter, mild steel rod[2]
22.5 sq. ft.	¼" diameter, mild steel rod[2]
25.0 sq. ft.	1" x 3/16", mild steel flats[3]

HANGERS FOR ATTACHING RUNNERS AND FURRING DIRECTLY TO BEAMS AND JOISTS FOR SUPPORTING RUNNERS

Single Hangers Between Beams[4].

Maximum Area Supported	Size
8 sq. ft.	12 gage wire
12 sq. ft.	10 gage wire
16 sq. ft.	8 gage wire

Double Wire Loops at Beams or Joists[4].

8 sq ft.	14 gage wire
12 sq. ft.	12 gage wire
16 sq. ft.	11 gage wire

FOR SUPPORTING FURRING WITHOUT RUNNERS[4]

Wire Loops at Supports

Type of Support	Maximum Area Supported	Size
Concrete	8 sq. ft.	14 gage wire
Steel	8 sq. ft.	16 gage wire (two loops)[5]
Wood	8 sq. ft.	16 gage wire (two loops)[5]

SPANS OF MAIN RUNNERS[6] [7]

Size and Type	Maximum Spacing of Hangers or Supports (Along Runners)	Maximum Spacing of Runners (Transverse)
¾"—.3 lb. per ft., cold or hot rolled channel	2'-0"	3'-0"
1-½"—.475 lb. per ft., cold rolled channel	3'-0"	4'-0"
1-½"—.475 lb. per ft., cold rolled channel	3'-6"	3'-6"
1-½"—.475 lb. per ft., cold rolled channel	4'-0"	3'-0"
1-½"—1.12 lb. per ft., hot rolled channel	4'-0"	5'-0"
2"—1.26 lb. per ft., hot rolled channel	5'-0"	5'-0"
1-½" x 1-½" x 3/16" angle	5'-0"	5'-0"

SPANS OF CROSS FURRING[6] [7]

Size and Type	Maximum Spacing of Runners & Supports	Maximum Spacing of Cross Furring Members (Transverse)
¼" diameter pencil rods	2'-0"	12"
⅜" diameter pencil rods	2'-0"	19"
⅜" diameter pencil rods	2'-6"	12"
¾"—.3 lb. per ft., cold or hot rolled channel	3'-0"	24"
	3'-6"	19"
	4'-0"	16"
1"—.410 lb. per ft., hot rolled channel	4'-0"	24"
	4'-6"	19"
	5'-0"	12"

[1]All gauges are U. S. Steel Wire Gauge.

[2]All rod hangers shall be protected with a zinc or cadmium coating or with a rust-inhibitive paint.

[3]All flat hangers shall be protected with a zinc or cadmium coating or with a rust-inhibitive paint.

[4]Inserts, special clips or other devices of equal strength may be substituted for those specified.

[5]Two loops of No. 18 gauge wire may be substituted for each loop of No. 16 gauge wire for attaching steel furring to steel or wood joists.

[6]These spans are based on webs of channels being erected vertically.

[7]Other sections of hot or cold rolled members of equivalent beam strength may be substituted for those specified.

SECTION 1806 — INTERIOR PLASTERING

1806.1

Number of Coats. Plastering with gypsum, lime or portland cement plaster shall be three-coat work when applied over metal and wire lath, fiber insulation lath and wood lath, and shall be not less than two-coat work when applied over other plaster bases allowed in this Chapter.

Lime or portland cement plaster shall not be applied directly to fiber insulation lath or gypsum lath.

Thickness. Grounds shall be installed to provide for the thickness of plaster, from face of plaster base to finished plaster surfaces, set forth in Table 1806.1.

If monolithic concrete ceiling surfaces require more than three-eighths inch (⅜") of plaster to produce desired lines or surfaces, metal lath or wire lath shall be attached thereto.

TABLE 1806.1—REQUIRED THICKNESS OF INTERIOR PLASTER

Backing	Thickness of Plaster, Including Finish Coat From Face of Plaster Base
Metal or wire lath	⅝" minimum*
All other types allowed	½" minimum
Masonry and Concrete Walls	⅝" minimum
Monolithic Concrete Ceilings	⅛" min. — ⅜" max.

*Plaster thickness when measured from the back plane of metal lath, exclusive of ribs, shall be ¾" minimum.

1806.2 — PROPORTIONING AND MIXING

Base Coats. The proportions of sand, vermiculite or perlite to 100 pounds of gypsum neat plaster shall not exceed the following:

(1) Gypsum or Hardwall Plaster

	Pounds, Damp, Loose Sand	Cu. Ft. Vermiculite or Perlite
(a) TWO COAT WORK (DOUBLE-UP METHOD)		
(1) Over Gypsum Lath	250	2-½
(2) Over Masonry (except over monolithic concrete)	300	3
(b) THREE COAT WORK		
(1) First (scratch) coat over lath	200[1]	2[1]
(2) First (scratch) coat over masonry	300	3
(3) All second (brown) coats	300[1]	3[1]

[1]: In lieu of the proportioning specified above, the proportions may be 100 pounds of gypsum neat plaster to not more than 250 pounds of damp, loose sand or 2-½ cubic feet of vermiculite or perlite, provided this proportioning is used for both scratch and brown coats.

(2) Wood Fiber Gypsum Plaster

On lath, mix with water only. On masonry, mix in proportions of 100 pounds of plaster to not more than 100 pounds of sand.

(3) Lime Plaster

(a) Three-coat work on metal and wire lath

(1) Scratch coat—10 cu. ft. lime putty or 450 lbs. of hydrated lime.
200 lbs. Keene's cement and 6 lbs. fiber to 1 cu. yd. of sand.

(2) Brown coat—7 cu. ft. lime putty or 300 lbs. hydrated lime. 150 lbs. Keene's cement and 4 lbs. fiber to 1 cu. yd. of sand.

(b) Two coat work on masonry and concrete.
Base coat—same proportions as brown coat on metal and wire lath.

(4) Portland Cement Plaster

The first two coats shall be as required for the first two coats of exterior work.

1806.3 — APPLICATION OF PLASTER

(a) Base Coats.

1. **Gypsum Plaster.** The scratch coat shall be applied with a sufficient material and pressure to form a full key or bond.

   For two-coat work it shall be doubled back to bring the plaster out to grounds and straightened to a true surface and left rough to receive the finish coat. For three-coat work, the surface shall be scratched to provide a bond for the brown coat and shall have been in place at least 12 hours before the second or brown coat is applied. The second or brown coat shall be brought out to grounds, and straightened to a true surface and left rough, ready to receive the finish coat.
2. **Lime Plaster.** The first two coats shall be applied in the same manner as gypsum plaster, except that in three-coat work, the second coat (brown) shall be applied over a dry base coat.
3. **Portland Cement Plaster.** The first two coats shall be as required for the first two coats of exterior work, except that the interval between the first and second coats shall be not less than 24 hours.

(b) Finish Coats.

1. **Smooth white finish** shall be applied over base coat which has set and is surface-dry. Thickness shall be from one-sixteenth inch (1/16") to one-eighth inch (⅛").
2. **Sand-float finish** shall be applied over set base coat which is not quite dry.
3. **Keene's cement finish** shall be applied over set base coat which is not quite dry. Thickness shall be from one-sixteenth inch (1/16") to one-eighth inch (⅛").
4. **The Finish coat** for interior portland cement plastering shall be applied in the same manner as required for the third coat of exterior portland cement plaster.
5. **Vermiculite finish** coat shall be applied over a base coat which is semi-green. Thickness shall be from one-sixteenth inch (1/16") to one-eighth (⅛").

(c) Plaster on Monolithic Concrete.

Monolithic concrete surfaces shall be clean, free from efflorescence, damp and sufficiently rough to insure adequate bond.

Gypsum plaster applied to monolithic concrete ceilings shall be specially prepared bond plaster for use on concrete, to which water only shall be added. Gypsum plaster on monolithic walls and columns shall be applied over a scratch coat of bond plaster before it has set. The brown coat shall

be brought out to grounds, straightened to a true surface and left rough, ready to receive finish coat.

Lime plaster applied to concrete walls shall be as specified in 1806.3.2.

Portland cement plaster applied to interior concrete walls or ceilings shall conform to requirements for application to exterior concrete walls as specified in Section 1807.3.

1806.4 — STAFF

Staff shall be soaked before sticking. Lugs shall be of pure fiber and plaster of paris. Rust-resistive fastenings of sufficient strength to anchor the staff to the support shall be not less than No. 14 B. and S. gauge copper wire.

1806.5 — BACKING

Studs shall be sheathed, or wire of not less than No. 18 U. S. Steel wire gauge shall be stretched taut horizontally at intervals not exceeding six inches (6") on centers vertically and securely fastened in place. Sheathing or strip wire shall not be required with metal lath or paper backed wire fabric.

(a) **Weather Protection.** Weather protection shall be provided during all curing periods.

(b) **Metal Reinforcement.** Exterior plaster, except when applied to concrete or masonry, shall be reinforced with one of the materials having a rust-resistive coated reinforcement as set forth in Table No. 1806.5.

Metal reinforcement shall be furred out from the backing at least one-quarter inch (¼") by an approved furring method, and shall be nailed with galvanized nails or approved furring devices driven to at least three-quarters inch (¾") penetration which shall be spaced not more than six inches (6") apart vertically and sixteen inches (16") apart horizontally. Metal reinforcement shall be lapped at least one full mesh at all joints. When no sheathing is used, all vertical joints shall be made at the studs, and horizontal joints where expanded metal or metal lath is used shall have at least one tie between studs, made with No. 18 U. S. Steel wire gauge galvanized annealed tie wire.

TABLE NO. 1806.5 — EXTERIOR PLASTER REINFORCEMENT

Type of Reinforcement	Minimum Gauge	Minimum Weight (lbs. per sq. yd.)
Expanded Metal		1.8
Metal Lath		3.4
Welded or Woven Wire Netting	18	1.4
Welded Wire Fabric	16	1.0

SECTION 1807 — EXTERIOR PLASTERING — APPLICATION

1807.1 — GENERAL

Exterior cement plaster shall be portland cement plaster meeting the requirements of Table No. 1807.1, except when applied over concrete or masonry.

TABLE 1807.1 — EXTERIOR PORTLAND CEMENT PLASTER

Coat	Maximum Volume of Sand Per Volume of Cement	Minimum Thickness	Minimum Period Moist Curing	Minimum Interval Before Application of Succeeding Coat
First or scratch	4	½"-*	48 hrs.	48 hrs.***
Second or brown	5	(1st and 2nd coats) ¾"	48 hrs.	7 days
Third or finish	3**	⅛"		

*Measured from backing to crest of scored plaster.

**Approved prepared finish coats containing not less than 1/3 by weight of portland cement may be used.

***To insure suction there should be a drying period after the moist curing period.

1807.2 — PLASTICITY AGENTS

Plasticity agents shall be of approved types and when added in the mixing of plaster shall be used in an amount not exceeding 10 per cent of the volume of portland cement. When added in the manufacturing process conforming to the requirements of Section 1802, no later additions shall be made.

1807.3 — APPLICATION — GENERAL

Except when applied to concrete or masonry, and except as otherwise provided for pneumatically applied plaster, exterior cement plastering materials shall be mixed by machine methods for not less than two minutes, and shall be applied in three coats as set forth in Table No. 1807.1.

The first coat shall be forced through all openings in the reinforcement so as solidly to fill all spaces. It shall then be scored horizontally with a scratcher having one-eighth inch (⅛") clipped teeth and grooves not more than one-half (½") deep.

The second coat shall be rodded and water floated, with no variation greater than one-quarter inch (¼") in any direction under a five-foot (5') straightedge.

The third coat may be a brush coat.

1807.4 — PLASTERING ON MASONRY OR CONCRETE

The masonry surface on which plaster is to be applied shall be clean, free of efflorescence, damp and sufficiently rough to insure proper bond. Mixtures specified for the second coat in this Section may be applied directly to masonry.

SECTION 1808 — PNEUMATICALLY PLACED PLASTER

Pneumatically placed cement plaster shall be a mixture of portland cement and sand, mixed dry, conveyed by air through a pipe of flexible tube, hydrated at the nozzle at the end of the conveyor and deposited by air pressure in its final position.

Rebound material may be screened and re-used as sand in an amount not greater than 25 per cent of the total sand in any batch.

Pneumatically placed cement plaster shall consist of a mixture of one part cement to not more than five parts of sand. Plasticity agents may be used as specified in Section 1807.2. Except when applied to concrete or masonry, such plaster shall be applied in not less than two coats to a minimum total thickness of seven-eights inch (⅞"). The first coat shall be rodded as specified in Section 1807.3 for the second coat. The curing period and time interval shall be as set forth in Table 1807.1.

SECTION 1809 — PORTLAND CEMENT PLASTER

Portland cement plaster not less than one and one-half inch (1½") in thickness reinforced in two directions with not less than three-tenths per cent of steel may be considered to act with the studs to resist bending and shear under horizontal forces when said reinforcement is anchored to the stud in such a manner as to resist effectively the stresses developed.

CHAPTER XIX

RAT-PROOF CONSTRUCTION

SECTION 1900 — RAT-PROOFING

This Chapter provides regulations governing the rat-proofing of occupancies that provide conditions favorable to rodent infestation and propagation.

SECTION 1901 — OCCUPANCY

Every building in which feed, foodstuff or food is stored, prepared processed, served or sold, shall be made, maintained or built of rat-proof construction by the owner, tenant, or occupant in accordance with the provisions of this section. This Chapter applies particularly to the following occupancies:

Group B—Cafes or Restaurants
(Curb Markets (see Section 1902.3).)
Group E—Large Restaurants
Group F—Storage
Group G—Slaughter Houses

1901.1 — EXISTING OR NEW BUILDINGS

(a) **Foundation Wall Ventilation Openings.** All foundation wall ventilator openings shall be covered for their entire height and width with perforated sheet metal plates of a thickness not less than fourteen (14) U. S. Standard Gauge or with expanded sheet metal of a thickness not less than eighteen (18) U. S. Standard Gauge or with cast iron grills or gratings, or with hardware cloth of nineteen (19) B. & S. Gauge or heavier. The openings therein shall not exceed one-half (½) inch.

(b) **Miscellaneous Foundation and Exterior Wall Openings**—All foundation and exterior wall openings (except those used for doors and screened windows), such as those openings around pipes, electric cables, conduits, openings due to deteriorated walls, broken masonry or concrete, shall be protected against the passage of rats by closing such openings with cement mortar, concrete masonry or non-corrodible metal.

(c) **Doors.** All exposed edges of the lower ten inches of wooden doors, door sills and jambs serving as rear or side entrances into business buildings from the ground, basement, or cellar floors, and other doors accessible to rats shall be protected against gnawing by covering doors, door sills and jambs with solid sheet metal of not less than twenty-four (24) U. S. Standard Gauge thickness.

All doors on which metal protection has been applied shall be hinged so as to be freeswinging. When closed, doors shall fit snugly

so that the maximum clearance between any door, door jambs and sills shall not be greater than three-eighths (⅜) inches.

Door jambs and sills constructed of metal, concrete, masonry, stone or cement mortar will be acceptable without metal protection as specified under paragraphs above.

(d) **Windows**—All windows and other openings for the purpose of light or ventilation located in exterior walls within two (2) feet above the existing ground level immediately below such opening shall be covered for their entire height and width, including frame, with wire cloth of at least nineteen (19) B. & S. Gauge having a mesh not larger than one-half (½) inch.

All windows and other openings for the purpose of light and ventilation in the exterior walls not covered in paragraph above, accessible to rats by way of exposed pipes, wires, conduits, and other appurtenances shall be covered with wire cloth of at least nineteen (19) B. & S. Gauge or heavier having a mesh not larger than one-half (½) inch or in lieu of wire cloth covering, said pipes, wires, conduits and other appurtenances shall be blocked from rat usage by installing solid sheet metal guards of twenty-four (24) U. S. Standard Gauge or heavier. Guards shall be fitted snugly around pipes, wires, conduit or other appurtenances. In addition, they shall be fastened securely to and shall extend perpendicularly from the exterior wall for a minimum distance of twelve (12) inches beyond and on either side of pipe, wire, conduit or appurtenance.

SECTION 1902 — CONSTRUCTION

1902.1 — MASONRY CONSTRUCTION AND CONCRETE FLOORS

All new buildings with concrete floors shall be constructed with no intervening space between the edge of the floor slab and building walls. All openings in the floor slab shall be properly protected against the passage of rats.

1902.2 — PIER AND WOOD CONSTRUCTION

(a) **Less Than Twelve Inches Above Ground.** All new buildings constructed on piers having wooden floor sills less than twelve (12) inches above the surface of the ground shall have the intervening space between the floor sills and ground protected against the passage of rats by installing a solid masonry, concrete curtain wall around the entire perimeter of the building and extending said curtain wall to a depth of not less than twenty-four (24) inches below the surface of the ground level and fastened securely to the exterior wall of the building.

Where curtain walls are not desirable, all ground floors of wood construction may be replaced with concrete of not less than four (4) inches in thickness with the exterior wall protected for a height of

twenty-four (24) inches above the concrete floor with masonry, concrete or solid sheet metal of twenty-four (24) U. S. Standard Gauge or heavier. Exterior wall protection shall be securely tied into the concrete floor at all points.

(b) **Over Twelve Inches Above Ground**—Buildings constructed on piers having wooden floor sills more than twelve (12) inches above the ground level, shall have the intervening spaces between floor sills and ground protected against the passage of rats by installing curtain walls in accordance with Section 1902.2 (a), or protecting said building against the passage of rats by installing solid sheet metal collars of twenty-four (24) U. S. Standard Gauge or heavier at top of each pier and snugly around each pipe, cable, wire, conduit or other utility service passing through wooden ground floor. Metal collars shall be not less than eight (8") inches greater in diameter than the pier, pipe, cable, wire, conduit or other utility service and shall be securely fastened underneath the wooden floor. All other openings in wooden ground floors through which rats may gain entrance into double walls or the interior of business buildings, such as openings that may exist in floors at double walls above floor sills, shall be closed with twenty-four (24) U. S. Standard Gauge or heavier solid sheet metal or sixteen (16) B. & S. Gauge or heavier wire cloth of one-half (½) inch mesh or with concrete or masonry.

1902.3 — CURB OR FARMER'S MARKET

The floors of Curb or Farmer's Markets in which fruit or vegetables are exposed and offered for sale shall be paved with four inches of concrete for the entire surface area of the market. The floor shall be protected by a curtain wall of concrete or masonry of not less than four (4) inches in thickness, hemetically sealed to the surface pavement, and extending not less than twenty-four inches below the ground surface. Curtain wall shall be extended around the entire perimeter of the floor pavement. Display racks, stands, or platforms on which fruit or vegetables are stored or offered for sale shall be of sufficient height that all such fruit or vegetables shall be kept at a distance of not less than eighteen (18) inches above the floor pavement and so constructed that rats cannot harbor in or under such racks.

CHAPTER XX

LIGHT, VENTILATION AND SANITATION

SECTION 2001 — LIGHT AND VENTILATION

2001.1 — MINIMUM REQUIREMENTS

Every habitable room of buildings hereafter erected shall have one or more windows, unless otherwise, specifically provided herein, to afford adequate light and ventilation. The requirements specified in this chapter shall be considered as minimum requirements supplementary to all State laws regulating light and ventilation.

Where windows are required such windows shall open on a street, public space, yard, or approved open space that will afford adequate air and light. Required windows shall be so constructed that when fully opened, the total open space shall not be less than one-half (½) the required window area.

Attics not used for habitational purposes shall have provisions for the emission of excess heat.

Skylights, vents, louvers or mechanical ventilation may be substituted for windows when approved by the Building Official, provided adequate natural light and ventilation is provided to meet the requirements of this chapter.

Except as otherwise provided herein, required windows shall have glazed openings of clear glass of area not less than one-tenth (1/10) of the floor area of the room served by them with the following exceptions:

Basements and cellars not used for habitational purposes—windows shall have an area not less than one-fiftieth (1/50) of the floor area served.
Storage rooms—windows shall have an area not less than one-twentieth (1/20) of the floor area served.
Obscure glass, glass blocks and similar glazed panels that admit less light than clear glass shall have area increased to admit amount of light equivalent to the above requirement.

Rooms where by reason of use or occupancy, dust fumes, gases, vapors, odors or other hazardous, obnoxious, or injurious impurities exist shall be provided with adequate additional ventilation to insure safe and healthful conditions.

2001.2 — ALCOVES

An alcove opening off a habitable room may be included as part of that room in determining the window area required provided eighty

per cent (80%) or more of the common wall area provides an unobstructed opening to the alcove.

2001.3 — BASEMENT ROOMS

No room that has less than fifty per cent (50%) of its height above the average adjoining finished grade shall be used for a Residential occupancy.

2001.4 — TOILETS

Toilet rooms shall not open directly into a kitchen or room used for the preparation of food.

Every toilet room shall have windows as specified for habitable rooms providing in no case less than three (3) sq. ft. of open space, or shall have approved, equivalent mechanical ventilation.

2001.5 — CLASSROOMS

Classrooms in School occupancies shall have at least unilateral light. The windows shall be located on the long axis of the room.

2001.6 — MECHANICAL VENTILATION

Where ventilation is provided by mechanical means, fresh air in sufficient quantity to maintain healthful conditions shall be provided to meet the requirements of all State laws. In the absence of such requirements, ventilation at least equivalent to the requirements of this code governing natural ventilation shall be provided.

Lavatories, toilets, bathrooms, and rest rooms shall be provided with at least two (2) cubic feet of fresh air per minute per square foot of floor area.

SECTION 2002 — SANITATION

2002.1 — TOILET FACILITIES

Toilet facilities shall be provided in all occupancies for each sex, except one family living units. The number provided for each sex shall be based on the maximum number of persons of that sex that may be expected to use such building at any one time. Where negroes and whites are accommodated there shall be separate toilet facilities provided for the former, marked plainly "For Negroes Only."

(See Plumbing Code for regulations governing installation and facilities)

CHAPTER XXI

SAFEGUARDS DURING CONSTRUCTION

SECTION 2101 — GENERAL

The temporary use of streets or public property for the storage or handling of materials or of equipment required for construction or demolition, and the protection provided to the public shall be in accordance with the provisions of this chapter.

2101.1 — ALLOWABLE USE OF PUBLIC PROPERTY DURING CONSTRUCTION

The amount of space and conditions under which public property may be use for construction or demolition purposes shall be as set forth below:

(a) One-third (⅓) of the width of street that is adjacent to the curb in front of the building being erected and for which a permit has been issued. If street in front of property adjoining such building is to be used for similarly limited storage, a due waiver of claim against the city for damages on account of such use, issued by the owner of such property, must be filed with the Building Official before such use shall be allowed.

(b) Provisions under which street or sidewalk space may be used:

1. That such one-third (⅓) allocated space or any portion thereof shall not come within five (5) feet of a rail or railway track.
2. That a walkway be constructed in the outer portion of the permissible occupied street space, conforming to the requirements of Section 2101.3.
3. That no building material, fence, shed or any obstruction of any kind shall be placed so as to obstruct free approach to any fire hydrant, lamp post, manhole, fire alarm box, or catch basin, or so as to interfere with the passage of water in the gutter. Protection against damage shall be provided to such utility fixtures during the progress of the work, but sight of them shall not be obstructed.
4. That a ten (10) foot clear roadway be maintained through any alley located along the building site.
5. That proper precaution shall be made during construction to prevent concrete, mortar washings, or any other material from entering a sewer.
6. The person or persons to whom a permit is issued for such purposes as stated above, shall post with the City a

bond of such type and amount as may be deemed advisable by the Director of Public Works protecting the City from any and all liability.

2101.2 — WHERE COVERED WALKWAYS ARE REQUIRED

During the erection or demolition of any building exceeding one (1) story in height that is located at a distance less than ten (10) feet or less than one-quarter (¼) of the height of the building from any street or alley property line, or when required by the Building Official, a roof covering for the entire length of the project shall be provided over the temporary or permanent sidewalk, from the time the construction or demolition extends above the second floor level until materials are no longer being used or handled on the front above such walk.

Buildings having their exteriors altered or repaired in an extensive manner involving any hazard shall be provided with a covered walk as required for new structures during erection.

Exception:
Where, in the opinion of the Building Official, a covered walk is not necessary, a permit may be issued to block off part of the sidewalk and have a temporary walk constructed as provided in Section 2101.3.

2101.3 — CONSTRUCTION OF WALKWAYS FENCES AND PROTECTIVE COVERING

Before any construction work is commenced the owner or his agent shall construct a temporary walkway in conformity with this section.

(a) All fences, barriers, or temporary structures of any kind located on public highways, shall be so constructed as not to obstruct vision at the intersection of streets.

(b) Walkways shall be not less than four (4) feet wide in the clear except that in congested districts the Building Official may require a walkway as wide as, in his opinion, is necessary. Walks shall be built in safe and substantial manner and be maintained in that condition at all times. A smooth handrail of substantial construction, not less than three (3) feet high, shall be provided on the traffic or street side of the walkway, and also on the building side when considered necessary by the Building Official.

(c) Where the distance from building to street or alley property line is less than half the height of the building, a fence of substantial solid construction at least eight (8) feet high shall be provided on the building side of the walkway.

(d) Roof coverings over walkways, as required by Section 2101.2, shall be constructed of not less than one layer of two (2)

inch nominal dimension wood plank spanning not over three (3) feet between supports, or equivalent decking. The framework supporting the walkway covering shall be well braced and designed to support at least one hundred fifty (150) Lbs. per Sq. Ft. but the top deck shall be designed to carry not less than two hundred fifty (250) Lbs. per Sq. Ft. The roof covering shall be of width sufficient to cover the entire walkway or sidewalk, and shall be made watertight. Suitable provision shall be made for adequate lighting of the walk under the covering, at all times. A minimum clearance of eight foot six inches (8'-6") shall be maintained above walkways.

2101.4 — WALKWAYS OVER EXCAVATED AREAS

When the area occupied by the sidewalk or temporary walkway is to be excavated, such walk shall be made of boards not less than two (2) inches nominal dimension designed to support a load of not less than one hundred and fifty (150) pounds per Sq. Ft., provided with suitable ramps at each end. Such walkways shall be provided with a fence and handrails on each side.

2101.5 — STORAGE OF MATERIALS OVER WALKWAYS

Whenever roofs of walkways are used for the storing of materials, it shall be designed for the load to which it is to be subjected and a railing and footboard shall be installed so as to prevent the materials from spilling into the streets. The posts and/or other supporting members on the street side shall be protected so as to insure against failure due to impact from street traffic.

2101.6 — WALKWAYS TO BE KEPT IN REPAIR

The street side of any barricade or fence, handrails and sidewalks shall be kept reasonably smooth and in good repair while construction work is in progress, or while such barricades, fences, or walkways are placed on or over public property.

2101.7 — CLEANING OF SIDEWALKS AND STREETS

The owner or his agent, upon the completion of the building, shall immediately remove all walkways, debris or any other obstructions and leave such public property in as good a condition as it was before such work was commenced.

2101.8 — RED LIGHTS REQUIRED

Every walkway shall be kept well lighted continuously between sunset and sunrise and the outer edge of the occupied space of the street or sidewalk shall have placed thereon "red lights" which shall burn continuously between sunset and sunrise.

2101.9 — SAFETY REQUIREMENTS DURING CONSTRUCTION

(a) **Scaffolds**—All scaffolds shall be substantially constructed to insure the safety of persons working on them or passing under or near them. Planks used for platforms shall be of not less than two (2) inch nominal thickness of sound, seasoned lumber or equivalent. Clear span between scaffolding supports shall not exceed ten (10) feet .
Where a large amount of scaffolding is used, the Building Official may require use of non-combustible material or lumber treated to make it fire-resistive. The flameproofing of tarpaulins may also be required by the Building Official where, in his opinion, the fire hazard warrants such precaution.

(b) **Hoists**—Temporary construction hoists shall be substantially constructed and protected to insure safe operation.

(c) **Standpipes**—In buildings under construction over three (3) stories in height, standpipes where required by the Code shall be installed as the work progresses. Connection outlets shall be provided at each floor level and all such connections and fittings from ground level up shall be designed to fit the fire department equipment. All standpipes shall be not less than two and one half inches (2½") in diameter and so located that 100 feet of one and one half (1½) inch hose will reach within 40 feet of the most remote part of each floor area.

2101.10 — PROTECTION OF ROOFS AND SKYLIGHTS OF ADJOINING BUILDINGS

When a building or structure is to be carried above the roof of an adjoining building, protection for the skylights and roof of such adjoining building shall be provided, at his own expense, by the person constructing or causing the construction of such building or structure; provided that if the owner, lessee or tenant of the adjoining building should refuse permission to have the roofs and skylights protected, the responsibility and expense for the necessary protection shall devolve on the person refusing such permission.

CHAPTER XXII

USE OF PUBLIC PROPERTY

SECTION 2201 — GENERAL

The use of public property or any portion thereof, shall be in accordance with the provisions of this chapter, except signs which shall conform to the requirements of Chapter XXIII, Signs and Outdoor Displays, and allowable use of public property during construction, Section 2101.1.

2201.1 — DOORS AND WINDOWS

No door in the city limits shall open or project upon public property. Exit doors, as specified in Section 1110, Doorways, which are required to open in the direction of exit travel, shall be set back from the property line by means of vestibules or similar enclosures. Windows which swing over public property shall have a clearance of not less than eight feet above the sidewalk or ground level.

2201.2 — MARQUEES OR FIXED AWNINGS

(a) Fixed awnings or marquees shall be entirely supported from the building.

(b) All combustible materials used in the construction of such awnings or marquees, shall be protected with not less than one hour fire-resistive protection as specified in Chapter X. All glazing in marquees or fixed awnings shall be of wired glass.

(c) Every fixed awning or marquee shall be at least nine feet in the clear, between the lowest point or projection and a sidewalk immediately below. (See 2303.5—Marquee Signs.)

(d) No fixed awning or marquee shall extend or occupy more than two-thirds (⅔) of the width of sidewalk measured from the building, except that such fixed awning or marquee may occupy the entire width of the sidewalk, provided it is fourteen feet in the clear above the sidewalk and does not extend more than twenty-five (25) feet along the direction of the length of the street. The overall height of any marquee, including signs, shall not exceed eight (8) feet, measured from the roof of such marquee.

Provided that marquees constructed with a roof live load of not less than forty (40) pounds per square foot shall be permitted the full width of the building (front) and full depth of the building, corner location.

2201.3 — MOVABLE AWNINGS (METAL OR CANVAS)

Metal or canvas awnings may extend over public property for a distance of not more than five (5) feet, provided such awnings or

any part thereof maintain a clear height of eight (8) feet above the sidewalk.

All such movable awnings shall be supported on metal frames attached to the building.

2201.4 — PROHIBITIVE LOCATIONS

(a) Every awning or marquee shall be so located as not to interfere with the operation of any exterior standpipe, stairway or exit from the building.

(b) Awnings or marquees shall not be used as a landing for any fire escape or exterior stair.

2201.5 — CONSTRUCTION REQUIREMENTS

Marquees and awnings shall be so constructed and anchored to the building so as to support all live and dead loads as specified in Chapter XII.

2201.6 — ROOF DRAINAGE REQUIRED

The roof of every fixed awning or marquee shall be sloped to down spouts at the building, which shall conduct all drainage under the sidewalk to the curb.

SECTION 2202 — OTHER PROJECTIONS

2202.1 — GENERAL

Every projection of any character over or upon public property shall maintain a clear height above the sidewalk or ground level of not less than eight feet. The allowable projection over public property shall not exceed the following measurements from the building.

Bay windows, porches, balconies, fire escapes—three (3) feet.

Cornices, Belt Courses, sills, pilasters, water tables or any decorative features—six (6) inches.

See Section 710 for fire protective requirements.

2202.2 — SIDEWALK OR STREET OBSTRUCTIONS

Public property shall be maintained clear of any and all obstructions, including among others, posts, columns, display of wares or merchandise and sidewalk signs.

SECTION 2203 — SPACE UNDER PUBLIC PROPERTY

2203.1 — SPACE UNDER SIDEWALK

Where space under the sidewalk is used for any purpose a special permit shall be required from the city governing authorities.

2203.2 — SIDEWALK LIGHTS

When glass is set in the sidewalk to provide light for spaces underneath, the glass shall be supported by metal or reinforced concrete frames and such glass shall be not less than one-half (½) inch in thickness. Where such glass is over twelve (12) square inches in area, it shall have wire mesh embedded in the glass. All portions of sidewalk lights shall be of not less strength than required in Section 1203.3 for sidewalks.

SECTION 2204 — MOVING OF BUILDINGS

2204.1 — GENERAL

No building or part of any building shall be moved through or across any sidewalk, street, alley or highway within the City limits without first obtaining a permit from the Building Official.

2204.2 — WRITTEN APPLICATION MUST BE FILED

Any person desiring to move a building shall first file with the Building Official a written application setting forth the following information.

(a) Type and kind of building to be moved.

(b) The original cost of such building.

(c) The extreme dimensions of the length, height and width of the building.

(d) Its present location and proposed new location by lot, block, subdivision and street numbers.

(e) The approximate time such building will be upon the streets, and the contemplated route that will be taken from present to new location.

2204.3 — BUILDING OFFICIAL SHALL REJECT WHEN

If in the opinion of the Building Official, the moving of any building will cause serious injury to persons or property or serious injury to the streets or other public improvements, or the building to be moved has deteriorated more than fifty per cent of its original value by fire or other element, or the moving of the building will violate any of the requirements of this Code or of the Zoning Regulations of the City, the permit shall not be issued and the building shall not be moved over the streets of the City.

Any building being moved for which permit was granted shall not be allowed to remain in or on the streets of the City for more than forty-eight hours.

2204.4 — BOND REQUIRED

The Building Official, as a condition precedent to the issuance of such permit, shall require a bond to be executed by person desiring such removal permit, with corporate surety to his satisfaction. Such bond shall be made payable to City and for such amount as he prescribes. It shall indemnify the City against any damage caused by the moving of such building to streets, curbs, sidewalks, shade trees, highways and any other property which may be affected by the moving of a building. Such surety bond shall also be conditioned upon and liable for strict compliance with the terms of said permit, as to route to be taken and limit of time in which to effect such removal and to repair or compensate for the repair and to pay said City as liquidated damages an amount not exceeding fifty dollars ($50.00) to be prescribed by the Building Official for each and every day's delay in completing such removal or in repairing any damage to property or public improvement or in clearing all public streets, alleys or highways of all debris occasioned thereby.

2204.5 — NOTICES TO BE GIVEN BY BUILDING OFFICIAL

Upon the issuance of said moving permit, the Building Official shall cause notice to be given to the Superintendent of Fire Alarm, Chief of Fire Department, telephone or light companies, or others whose property may be affected by such removal. The Building Department shall set forth in all notices the route that will be taken, time started, and approximate time of completion.

2204.6 — PUBLIC SAFETY REQUIREMENTS

(a) Lights required

Every building which occupies any portion of public property after sundown, shall have sufficient lights continuously burning between sunset and sunrise for the protection of the public.

(b) Number and location

There shall be a minimum of five red lights placed on each street side of the building; such red lights shall be attached to the building in such a fashion as to indicate extreme width, height, and size.

(c) Flares required

There shall be placed in addition to the red lights on the building, flares at regular intervals for a distance of two hundred feet up the street on each side of the building.

(d) Flagmen required

When more than fifty per cent of the street, measured between curbs, is occupied at night by the building, or when in the opinion of the Building Official, flagmen are necessary to divert or caution traffic, the owner or person moving such building shall employ at their expense, two flagmen, one at each street intersection beyond the building; such flagmen shall remain at these intersections, diverting or cautioning traffic from sunset to sunrise. Red lights shall be employed in flagging traffic at night.

CHAPTER XXIII

SIGNS AND OUTDOOR DISPLAYS

SECTION 2301 — GENERAL

2301.1 — OUTDOOR ADVERTISING DISPLAYS

Outdoor advertising displays, means any letter, figure, character, mark, plane, point, marquee sign, design, poster, pictorial, picture, stroke, stripe, line, trademark, reading matter or illuminated service, which shall be so constructed, placed, attached, painted, erected, fastened or manufactured in any manner whatsoever, so that the same shall be used for the attraction of the public to any place, subject, person, firm, corporation, public performance, article, machine or merchandise, whatsoever, which are displayed in any manner whatsoever out of doors. Every outdoor display shall be classified and conform to the requirements of that classfication as set forth in this chapter.

2301.2 — CLASSIFICATIONS

For the purpose of this chapter and the regulations and provisions thereof, outdoor advertising displays shall be classified into one of the following type signs:

(a) **Spectacular Signs**—means an "Outdoor Advertising Display Sign" advertising copy usually animated, constructed of metal, wired for lights or luminous tubing, or both, with copy action controlled by the flasher circuit breakers or matographs and attached on an open face steel structure built especially for the purpose.

Spectacular signs may be built upon the ground, attached to a wall, or above the roof, or projecting from a wall, provided that such spectacular sign meets the requirements of the provisions of this Code governing ground, roof, wall, projection or marquee sign, depending upon where such sign is built, as set forth below.

Spectacular signs shall be illuminated with electricity only.

(b) **Ground Sign**—means an "Outdoor Advertising Display Sign" when such sign is supported by uprights or braces in or upon the ground.

(c) **Roof Sign**—means an "Outdoor Advertising Display Sign" erected, constructed, or maintained above the roof of any building.

(d) **Wall Sign**—means an "Outdoor Advertising Display Sign" that shall be affixed to the wall of any building, when such sign shall project not more than twelve (12) inches from the building.

(e) **Projection Sign**—means an "Outdoor Advertising Display Sign" which is affixed to any building wall or structure and extends

beyond the building wall, structure, building line or property line more than twelve (12) inches.

(f) **Marquee Sign**—means a projecting sign attached to or hung from a marquee and said marquee shall be known to mean a canopy or covered structure projecting from and supported by a building, when such canopy or covered structure extends beyond the building, building line or property line.

(g) **Shingle Sign**—means a projection or wall sign not over six (6) square feet in area, constructed of metal or other non-combustible material attached securely to a building and not projecting more than twenty-four (24) inches over public property.

2301.3 — PERMITS REQUIRED

(a) No "Outdoor Advertising Display Sign" shall hereafter be erected, constructed, altered or maintained except as provided in this Code, until after permit for the same has been issued by the Building Official as specified in Sections 105 and 106 and the fee paid as specified in Section 107, Fees.

2301.3 (b) — EXEMPTION

No permit fee shall be required for a shingle sign over a show window or door of a store or business establishment, announcing without display or elaboration, only the name of the proprietor and nature of the business; nor shall a permit be required for a ground sign advertising for sale or rent property, providing such sign is not over fifteen (15) square feet in area.

2301.4 — IDENTIFICATION OF SIGNS

Every Outdoor Advertising Display Sign hereafter erected, constructed or maintained, for which a permit is required shall be plainly marked with the name of the person, firm or corporation erecting and maintaining such sign and shall have affixed on the front thereof the number of permit issued for said sign by the Building Official.

2301.5 — ANNUAL INSPECTION

It shall be the duty of the Building Official or his authorized agent to inspect every ground sign, roof sign, wall sign, and projection sign at least once annually.

2301.6 — UNSAFE SIGNS

Should any sign become insecure or in danger of falling or otherwise unsafe in the opinion of the Building Official, the owner thereof, or the person or firm maintaining the same, shall upon written notice from the Building Official, forthwith in the case of immediate danger and in any case within ten (10) days, secure the same in a manner to be approved by the Building Official, in conformity with the provisions of this Code or remove such sign. If such order is not complied

with in ten (10) days the Building Official shall remove such sign at the expense of the owner or lessee thereof.

2301.7 — MAINTENANCE

All signs for which a permit is required, together with all their supports, braces, guys and anchors shall be kept in repair and unless of galvanized or non-corroding metal shall be thoroughly painted at least once every two years. The Building Official may order the removal of any sign that is not maintained in accordance with the provisions of this section. Such removal shall be at the expense of the owner or lessee.

2301.8 — UNLAWFUL SIGNS

In case any sign shall be installed, erected, or constructed in violation of any of the terms of this Code the Building Official shall notify by registered mail or written notice served personally, the owner or lessee thereof to alter such sign so as to comply with this Code or of the Zoning Regulations of the City and to secure the necessary permit therfor, or to remove the sign. If such order is not complied with in ten (10) days the Building Official shall remove such sign at the expense of the owner or lessee thereof.

2301.9 — LOCATION RESTRICTIONS

No Outdoor Advertising Display Sign shall be erected, constructed or maintained so as to obstruct any fire escape or any window or door or opening used as a means of egress or so as to prevent free passage from one part of a roof to any other part thereof. No sign shall be attached in any form, shape or manner to a fire escape, nor be placed in such manner as to interfere with any opening required for legal ventilation.

2301.10 — SIGNS PROJECTING OVER PUBLIC PROPERTY

Signs projecting from a building or extending over public property shall maintain a clear height of nine (9) feet above the sidewalk and all such signs shall not extend more than eighteen (18) inches of the curbline.

SECTION 2302 — STRUCTURAL REQUIREMENTS

2302.1 — DESIGN AND STRESS DIAGRAMS REQUIRED

Before a permit shall be granted the erector of every Outdoor Advertising Sign with the exception of shingle signs and light cloth temporary signs, shall submit to the Building Official a design and stress diagram or plan, containing the necessary information to enable the

Building Official to determine that such sign complies with all the regulations of this Code.

2302.2 — WIND PRESSURE

In the design and erection of all Outdoor Advertising Display Signs, the effect of wind shall be carefully considered. All signs shall be so constructed as to withstand the wind pressure as specified in Section 1205.

2302.3 — WORKING STRESSES

(a) In all Outdoor Advertising Display Signs, the allowable working stresses shall conform with the requirements of Section 1205 of this Code, except as specified below.

The allowable working stresses for steel and wood shall be in accordance with the provisions of Chapter XV—"Structural Steel" and Chapter XVII—"Wood."

(b) The working strength of chains, cables, guys or steel rods shall not exceed one-fifth (1/5) of the ultimate strength of such chains, cables, guys or steel rods.

SECTION 2303 — CONSTRUCTION

2303.1 — GROUND SIGNS

(a) No ground sign constructed entirely of wood material shall be at any point over twenty-four (24) feet above the ground level or located in Fire District Number 1 or 2, but when the facing of a ground sign is constructed entirely of sheet metal or other non-combustible material such ground sign may be erected within or without the fire districts and the supports, braces, battens, ornamental moulding, platform and decorative trim may be of wood material.

(b) Lighting reflectors may project beyond the face of the sign.

(c) The bottom coping of every ground sign shall be at least three (3) feet above the ground or street level, which space may be filled with platform decorative trim or light wooden construction.

(d) Every ground sign shall provide rigid construction to withstand wind action in all directions.

(e) Any person or persons, partnership, firm or corporation occupying any vacant lot or premises by means of a ground sign, shall be subject to the same duties and responsibilities as the owner of the lot or premises, with respect to keeping the same clean, sanitary, inoffensive, free and clear of all obnoxious substances and unsightly conditions on the ground in the vicinity of such ground sign on said premises for which they may be responsible.

(f) Wherever anchors or supports consist of wood embedded in the soil, the wood shall be pressure-treated with an approved preservative.

2303.2 — ROOF SIGNS

(a) All roof signs shall be so constructed as to leave a clear space of not less than six (6) feet between the roof level and the lowest part of the sign and shall have at least five (5) feet clearance between the vertical supports thereof; no portion of any roof sign structure shall project beyond an exterior wall.

(b) Every roof sign shall be constructed entirely of steel construction, including the upright supports and braces, except that only the ornamental moulding and battens behind the steel facing and the decorative lattice work may be of wooden construction.

(c) The bearing plates of all roof signs, shall distribute the load directly to or upon masonry walls, steel roof girders, columns or beams. The building shall be designed to avoid overstress of these members.

(d) No roof sign having a tight or solid surface shall be at any point over twenty-four (24) feet above the roof level.

Open roof signs in which the uniform open area is not less than forty (40) per cent of total gross area may be erected to a height of seventy-five (75) feet on buildings of Type I or Type II Construction and on other type buildings to a height of forty (40) feet, all such signs shall be thoroughly secured to the building upon which they are installed, erected or constructed by iron, metal anchors, bolts, supports, chains, stranded cables, steel rods or braces and they shall be maintained in good condition as set forth in Section 2301.7.

2303.3 — WALL SIGNS

(a) Wall signs attached to exterior walls of solid masonry, concrete or stone, shall be safely and securely attached to the same by means of metal anchors, bolts or expansion screws of not less than three-eighths (⅜) inch in diameter and shall be embedded at least five (5) inches. No wooden blocks shall be used for anchorage, except in the case of wall signs attached to buildings with walls of wood. No wall sign shall be supported by anchorages secured to an unbraced parapet wall.

(b) The surface face of all wall bulletins must be of sheet metal but the ornamental moulding surrounding same may be of wooden construction. Temporary cloth signs with wood frames may be kept in place for a period not exceeding thirty (30) days.

2303.4 — PROJECTING SIGNS

(a) All projecting signs shall be constructed entirely of metal or other non-combustible material and securely attached to a building or structure by metal supports such as bolts, anchors, supports, chains,

guys or steel rods. No staples or nails shall be used to secure any projecting sign to any building or structure.

(b) The dead load of projecting signs, not parallel to the building or structure and the load due to wind pressure shall be supported with chains, guys, or steel rods having net cross sectional dimension of not less than three-eighths (⅜) inch in diameter. Such supports shall be erected or maintained at angle of at least 45 degrees with the horizontal to resist the dead load and at an angle of 45 degrees or more with the face of the sign to resist the specified wind pressure. If such projecting sign exceeds thirty (30) square feet in one facial area, there shall be provided at least two such supports on each side not more than eight feet apart to resist the wind pressure.

(c) **Anchorage**—All supports shall be secured to a bolt or expansion screw that will develop the strength of the supporting chain, guys or steel rod, with a minimum five-eighths (⅝) inch bolt or lag screw, by an expansion shield. Turn buckles shall be placed in all chains, guys or steel rods supporting projecting signs.

(d) Chains, cables, guys, or steel rods used to support the live or dead load of projecting signs may be fastened to solid masonry walls with expansion bolts or by machine screws in iron supports, but no such supports shall be attached to an unbraced parapet wall. Where the supports must be fastened to walls made of wood, the supporting anchor bolts must go through the wall and be plated or fastened on the inside in a secure manner.

(e) No projecting sign shall be erected on the wall of any building so as to project above the roof or cornice wall or above the roof level where there is no cornice wall; except that a sign erected at a right angle to the building, the horizontal width of which sign perpendicular to such wall does not exceed eighteen (18) inches may be erected to a height not exceeding two (2) feet above the roof or cornice wall or above the roof level where there is no cornice wall. A sign attached to a corner of a building and parallel to the vertical line of such corner, shall be deemed to be erected at a right angle to the building wall.

2303.5 — MARQUEE SIGNS

Marquee signs shall be constructed entirely of metal or non-combustible material and may be attached to, or hung from a marquee, and such signs when hung from a marquee shall be at least eight (8) feet at its lowest level above the sidewalk or ground level, and further, no such sign shall extend outside the line of such marquee. Marquee signs may be attached to the sides and front of a marquee, and such sign may extend the entire length and width of said marquee, provided such sign does not extend more than six (6) feet above, nor one (1) foot below such marquee, but under no circumstances, shall the sign or signs have a vertical dimension greater than eight (8) feet.

2303.6 — SPECTACULAR SIGNS

All permits for spectacular signs shall be issued by the Building

Official upon application therefor, after approval by the department having jurisdiction over electricity, upon payment of the required permit fee. The permit to erect or maintain a spectacular sign shall be good for one (1) year. The Building Official may issue a renewal of the permit issued hereunder upon the expiration thereof or within thirty (30) days thereafter upon the payment by the applicant of a renewal fee of two dollars ($2.00) and by surrendering the old permit, accompanied by satisfactory proof in the form of an affidavit that the sign is as safe as when originally licensed and that the wiring or piping of the same is in good condition. All spectacular signs shall be constructed of non-combustible materials.

SECTION 2304 — USE OF PLASTIC MATERIALS

Letters, decorations and facings of signs constructed of non-combustible materials may be made from slow-burning plastics, provided that when plastic facings are employed in electric signs, the area of each face shall not exceed 100 square feet, and provided that when plastic letters and/or decorations are employed in electric signs the area of the display surface or facing occupied or covered by such letters and decorations shall not exceed a total area calculated on the following basis:

Area of the Display Surface	Area Occupied or Covered by Plastics
Less than 100 square feet	100% of display surface area
Over 100 square feet but less than 300 square feet	100 square feet plus 25% of the difference between 100 square feet and the area of the display surface
Over 300 square feet but less than 2000 square feet	150 square feet plus 25% of the difference between 300 square feet and the area of the display surface.

CHAPTER XXIV

ELEVATORS AND ESCALATORS

2401.1

Elevators, escalators and dumbwaiters shall be constructed, installed and maintained to provide proper safety in accordance with the requirements of this Code. Construction of elevators, escalators and dumbwaiters shall conform with the "American Standard Safety Code for Elevators, Dumbwaiters and Escalators" (ASA-A17.1) of the American Standards Association.

2401.2

(a) All openings in elevator shafts shall be protected. Elevators and escalators shall be enclosed as required in Section 701.

(b) The safe capacity of every elevator shall be conspicuously posted.

(c) Every elevator and escalator shall be equipped with approved safety devices to prevent injury to its occupants from excessive speed. There shall be approved safety devices to prevent an elevator from being moved while any shaft door is open.

(d) Every passenger elevator shall have an emergency exit.

(e) Elevators and escalators may be used as required exits only as provided in Chapter XI — Exit Requirements.

CHAPTER XXIV

ELEVATORS AND ESCALATORS

CHAPTER XXV

PREFABRICATED CONSTRUCTION

2501 — GENERAL

Prefabricated construction shall conform to the requirements of this Code, except as otherwise provided for in this Chapter.

2502 — LOADS

Live, dead and wind load requirements shall conform to the requirements, as set forth in Chapter XII.

2503 — STRUCTURAL DESIGN

Where the size and spacing of framing members on materials is in conflict with, or not covered by this Code, they will be acceptable if the assembly meets the load requirements of this Code, provided they conform to the requirements as set forth for tests under Section 2504.

2504 — TESTS

(a) Every manufacturer of prefabricated construction shall file with the Building Official, duplicate copies of a certificate from a recognized testing laboratory, which states that tests have been made on this particular type of prefabricated construction, and showing the live, dead and wind load capacities in pounds, per square foot, uniformly distributed, together with a detailed physical description of the panels tested.

(b) Panels and other elements tested for loads shall sustain, without failure, for a period of 24 hours, a superimposed load equal to 2½ times the live load. Recovery within 24 hours, after removal of the full test load, shall be not less than seventy-five (75) percent of the observed deflection. The measured deflection of any panel or element under full live load shall be not over one three-hundred-and-sixtieth (1/360) of the clear span.

(c) When it is definitely ascertained by the Building Official that the requirements of this Code have been met, a permit shall be issued. A copy of all testing laboratory certifications shall be filed as a permanent record in the office of the Building Official.

2505 — PLYWOOD

Plywood of Douglas fir shall conform to U. S. Commercial Standard CS45-55. Plywood of other species, when used structurally, shall be identified as to veneer grade and glue type by an approved agency and shall meet the performance standards in U. S. Commercial Standard CS45-55 for its type.

CHAPTER XXV

PREFABRICATED CONSTRUCTION

2501 — GENERAL

Prefabricated construction shall conform to the requirements of this Code, except as otherwise provided for in this Chapter.

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2503 — STRUCTURAL DESIGN

Where the size and spacing of framing members on materials is in conflict with, or not covered by this Code, they will be acceptable if the assembly meets the load requirements of this Code, provided they conform to the requirements as set forth for tests under Section 2504.

2504 — TESTS

(a) Every manufacturer of prefabricated construction shall file with the Building Official, duplicate copies of a certificate from a recognized testing laboratory, which states that tests have been made on this particular type of prefabricated construction, and showing the live, dead and wind load capacities in pounds, per square foot, uniformly distributed, together with a detailed physical description of the panels tested.

(b) Panels and other elements tested for loads shall sustain, without failure, for a period of 24 hours, a superimposed load equal to 2½ times the live load. Recovery within 24 hours, after removal of the full test load, shall be not less than seventy-five (75) percent of the observed deflection. The measured deflection of any panel or element under full live load shall be not over one three-hundred-and-sixtieth (1/360) of the clear span.

(c) When it is definitely ascertained by the Building Official that the requirements of this Code have been met, a permit shall be issued. A copy of all testing laboratory certifications shall be filed as a permanent record in the office of the Building Official.

2505 — PLYWOOD

Plywood of Douglas fir shall conform to U. S. Commercial Standard CS45-55. Plywood of other species, when used structurally, shall be identified as to veneer grade and glue type by an approved agency and shall meet the performance standards in U. S. Commercial Standard CS45-55 for its type.

CHAPTER XXVI

PLASTICS

SECTION 2601 — GENERAL

2601.1 — SCOPE AND USES

Plastic materials regulated by this chapter shall be those materials made wholly or principally from standardized plastics listed and described in the 1957 edition of "Technical Data on Plastics," published by the Manufacturing Chemists' Association.

This Chapter pertains to the use of plastics in the following applications only.

Wall panels.
Glazing.
Roof Panels.
Skylights.
Light-transmitting panels in monitors and sawtooth roofs.
Light-diffusing systems in ceilings.
Partitions.
Exterior veneers.
Awnings and similar shelters.
Greenhouses.
Signs and outdoor displays.

2601.2 — APPROVED PLASTIC MATERIAL DEFINED

For the purposes of this Chapter, an approved plastic shall be the material found to be marked or labeled or to carry an identification by the manufacturer of the material denoting its class of plastics; or as approved by the Building Official.

The basis of approval of such approved plastic material shall take into consideration the materials when tested by a recognized laboratory in accordance with A.S.T.M Designation D635-56T, under which the material shall not burn faster than 2.5 inches per minute, or A.S.T.M. Designation D568-56T, under which the material shall not be consumed in less than 2 minutes, and A.S.T.M. Designation D374-57T. The Building Official may accept the classes of plastics as approved by the Committee on Compliance of the Southern Building Code Congress.

2601.3 — CLASSES OF PLASTICS

(a) Class A plastic materials shall be those reinforced or unreinforced approved plastic materials which are self-extinguishing

when tested in accordance with the test procedures described in 2601.2 above.

(b) Class B plastic materials shall be those approved plastic materials which are reinforced with glass fiber or other non-combustible material mounting to not less than 1.5 ounces per square foot and not less than 10 per cent by weight of the plastic panel or sheet.

(c) Class C plastic materials shall be those approved plastic materials which are reinforced with glass fiber or other non-combustible material amounting to not less than 5 per cent by weight of the plastic panel or sheet.

(d) Class D plastic materials shall be approved plastic materials other than Class A, B or C, which meet the requirements of Section 2601.2.

2601.4 — DESIGN LOADS

Design Loads shall conform to the provisions of Chapter XII of this Code.

SECTION 2602 — WALL PANELS

2602.1 — GENERAL

Wall panels shall mean plastic sheets used as a light-transmitting medium in exterior walls. Such panels may be installed only in wall areas in which openings are not required to be fire protected, and access panels shall be provided as required by the Code for structure and occupancy.

2602.2 — CLASS A AND B PLASTICS

Class A and Class B plastic sheets may be used in wall panels in Types III, IV, V and VI buildings except in occupancy classifications E, D and H provided:

(a) The total area of plastic panels does not exceed 20 per cent of the wall area in any one story of the structure.

(b) No section of plastic panels shall exceed one hundred feet (100') in length horizontally and no section shall exceed twelve feet (12') in height.

(c) In Types III, IV and V buildings, sections up to forty feet (40') in length shall be separated longitudinally by a section of conforming materials equal in width to 10 per cent of the length of the section or four feet (4'), whichever is greater. Sections over forty feet (40') in length shall be separated by a section of approved non-combustible siding at least eight feet (8') in width.

(d) In Types III, IV and V buildings, parallel sections shall be separated vertically by a section of conforming materials at least eight feet (8') in height.

2602.3 — CLASS C AND D PLASTICS

Class C and D plastics may be used as wall panels in locations and subject to the conditions specified for Class A and B plastics provided the area of such panels does not exceed 20 per cent of the wall area in any one story of the structure and no section of such panels is over fifty feet (50') in length or eight feet (8') in height.

SECTION 2603 — GLAZING OF UNPROTECTED OPENINGS

Doors, sash and framed openings may be glazed or equipped with transparent or translucent approved plastic materials, where such openings are not required to be fire protected, provided that the area so glazed shall not exceed 20 per cent of the wall area nor be located at a height greater than twenty feet (20') above grade level, unless greater areas and heights are approved by the Building Official.

SECTION 2604 — ROOF PANELS

2604.1 — GENERAL

Transparent or translucent plastic panels may be used in roofs not required to have a fire-resistive rating and in all roofs where sprinkler protection is provided, except for Occupancy Classifications D, E and H, provided:

(a) That on structures or over occupancies required to have fire-retardant or non-combustible roofing, the panels conform to the slope of the roof which shall be at least four inches in twelve inches (4" in 12") or steeper, and each area of plastic panels shall be separated from every other area of plastic planels by at least eight feet (8') laterally and ten feet (10') along the slope of the roof.

(b) All plastic roof panels shall be attached directly to the building framework or shall be mounted individually in steel or other approved metal frames.

(c) Corrugated panels shall be pitched in the direction of the corrugations.

2604.2 — AREA LIMITATIONS

Plastic sections installed on roofs required to have a fire-retardant or non-combustible roofing shall conform to the following area limitations:

(a) **Class A Plastics.** No section shall exceed three hundred square feet (300 sq. ft.) in area, and the aggregate area of such sections shall not exceed 20 per cent of the floor area of the room or occupancy sheltered by the roof.

(b) **Class B Plastics.** No section shall exceed three hundred square feet (300 sq. ft.) in area, and the aggregate area of such sections

shall not exceed 12½ per cent of the floor area of the room or occupancy sheltered by the roof.

(c) **Class C and D Plastics.** No section shall exceed one hundred square feet (100 sq. ft.) in area, and the aggregate area of such sections shall not exceed 7½ per cent of the floor area of the room or occupancy sheltered by the roof.

SECTION 2605 — SKYLIGHTS

2605.1 — GENERAL

Approved plastics may be used in skylights provided that:

(a) The skylight is not installed over a shaft or stairwell or over occupancy classifications E and H.

(b) The plastic is mounted at least four inches (4") above the roof on a non-combustible or metal clad curb of at least twelve inches (12") for industrial and commercial structures, and six inches (6") for residential structures.

(c) The plastic units are installed at least five feet (5') apart and not less than five feet (5') from any exterior wall, and in no case shall such units be installed within the distance from an exposure within which openings in walls are required to be fire protected.

(d) Flat or corrugated panels shall slope from the horizontal at least three inches in twelve inches (3" in 12") and the panel shall not exceed ten feet (10') from the bottom to the top of the inclined plane. Corrugations shall run with the inclined plane.

(e) Dome-shaped or curved units shall rise above the mounting flange a minimum distance equal to 10 per cent of its maximum span or five inches (5"), whichever is the greater.

(f) The edges of the plastic material are enclosed in metal.

2605.2 — CLASS A PLASTICS

Class A plastics may be used in skylights provided:

(a) The maximum area enclosed within the curb of units shall not exceed three hundred square feet (300 sq. ft.).

(b) The aggregate area of all such units shall not exceed 20 per cent of the floor area of the room sheltered by the roof in which the units are installed.

2605.3 — CLASS B PLASTICS

Class B plastics may be used in skylights under the same conditions as allowed in subsection 2605.2 except that the aggregate area shall not exceed 12½ per cent of the floor area sheltered by the roof upon which it is erected.

2605.4 — CLASS C AND D PLASTICS

Class C and D plastics may be used in skylights provided:

(a) The maximum area enclosed within the curb of units equipped with flat or corrugated plastic sheets shall not exceed one hundred square feet (100 sq. ft.).

(b) The aggregate area of all such units shall not exceed 7½ per cent of the floor area of the room sheltered by the roof in which the units are installed.

(c) Flat or corrugated units shall slope from the horizontal at least four inches in twelve inches (4" in 12") and shall not exceed eight feet (8') from the bottom to the top of the inclined plane.

SECTION 2606 — LIGHT-TRANSMITTING PANELS IN MONITORS AND SAWTOOTH ROOFS

2606.1 — GENERAL

Approved plastics may be used as light-transmitting panels in monitors and sawtooth roofs with or without sash, provided:

(a) The lower edge of the plastic material shall be at least six inches (6") above the horizontal surface of the roof.

(b) The areas of such plastic panels shall be separated from each other by a section of non-combustible material or by a section of the roofing material of the structure, said section to be equal in length to one tenth (1/10) of the length of the plastic section or five feet (5'), whichever is greater.

2606.2 — CLASS A AND B PLASTICS

When Class A and B plastics are used the maximum length of a section of plastic panels shall not exceed one hundred feet (100'), and the distance between the upper and lower edges shall not exceed ten feet (10').

2606.3 — CLASS C AND D PLASTICS

When Class C and D plastics are used, the maximum length of a section of plastic panels shall not exceed fifty feet (50') and the distance between the upper and lower edges shall not exceed eight feet (8').

SECTION 2607 — LIGHT-DIFFUSING SYSTEMS IN CEILINGS

2607.1 — GENERAL

Plastic light-diffusing systems in ceilings shall mean installations of plastic panels suspended below lighting fixtures for the purpose of diffusing light throughout a room or space and supported directly or indirectly from floor or roof construction. Plastic diffusers installed in surface mounted or recessed fixtures shall not be subject

to the requirements of this section unless the aggregate area of the diffusers exceeds 15 per cent of the area of the ceiling.

No plastic light-diffusing system shall be installed in areas required to be equipped with automatic sprinklers unless appropriate tests by a recognized laboratory have shown that such system does not prevent effective operation of the sprinklers or unless sprinklers are located both above and below the light-diffusing system to give effective sprinkler protection.

Plastic diffusers in systems in which the aggregate plastic area exceeds 15 per cent of the ceiling area shall comply with Section 704.3 unless the plastic panels have heat distortion temperature of 225° F. or less (ASTM Method D648-45T), and will fall from their mountings at an ambient temperature of at least 200° F. below the ignition temperature of the plastic material as shown in appropriate tests by a recognized testing laboratory. Such panels which exceed two (2) ounces per sq. ft. in weight shall not exceed 10 ft. in length, and such panels which weigh less than two (2) ounces per sq. ft. shall not exceed 25 ft. in length. In no case shall the weight of such panels be more than eight (8) ounces per sq. ft.

In Type I, II, III and IV buildings all hangers and fasteners shall be of non-combustible material. Hangers shall be at least No. 12 U. S. Standard gauge galvanized wire or equivalent.

The maximum temperature in the space between the panel and the ceiling shall not exceed the manuufacturer's recommended maximum service temperature for the plastics employed in the panel.

2607.2 — CLASS A PLASTICS

Class A plastics may be used for light-diffusing systems in ceilings in all types of buildings and occupancies, subject to approval of the Building Official.

2607.3 — CLASS B, C AND D PLASTICS

Class B, C, and D plastics shall not be installed in required fire exits or corridors or in occupancies D, E and H. In other rooms or spaces, panels of Class B, C and D plastics may be installed as light-diffusing systems provided the aggregate plastic area does not exceed 15 per cent of the ceiling area.

SECTION 2608 — PARTITIONS

2608.1 — CLASS A PLASTICS

Where partitions may be of combustible construction, Class A plastics may be used for the construction of the entire partition.

2608.2 — APPROVED PLASTICS IN LIEU OF PLAIN GLASS

Plastics may be used to provide the light-transmitting medium in the upper half of partitions where plain glass is permitted, provided the area of plastic so installed does not exceed in the aggregate one-third (⅓) of the area of the partition in which installed.

2608.3 — APPROVED PLASTICS IN MOVABLE PARTITIONS

Approved plastics may also be installed in openings in movable partitions made of metal or other non-combustible material, provided the area of plastic so installed does not exceed in the aggregate one-half (½) of the area of the partition in which installed.

SECTION 2609 — EXTERIOR VENEER

Class A plastics may be used as exterior veneer in accordance with general requirements of Chapter XIV.

SECTION 2610 — AWNINGS AND SIMILAR SHELTERS

Class A and B plastics may be used on awnings and similar structures in conformance with general provisions of Chapter XXII.

SECTION 2611 — GREENHOUSES

Class A and B plastics may be substituted for wire glass in the construction of greenhouses and Class A, B, C and D plastics may be used in lieu of plain glass.

SECTION 2612 — SIGNS AND OUTDOOR DISPLAYS

The use of plastics in signs, outdoor displays and similar structures shall be governed by provisions of Chapter XXIII.

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APPENDIX "A"

WEIGHTS OF BUILDING MATERIALS

MATERIALS	Weight Lb. Per Sq. Ft.
CEILINGS	
Gypsum ceiling block, 2" thick, unplastered	10
Plaster board, unplastered	3
Plaster, ¾", and wood lath	8
Plaster, ¾" and metal lath	8
Plaster, on tile or concrete	5
Suspended, metal lath and plaster	10
FLOORS	
Hardwood flooring, ⅞" thick	4
Sheathing, yellow pine, 1" Oregon pine, spruce or hemlock, ⅞" thick	2½
Sheathing, yellow pine, 1" thick	4
Wood block, creosoted, 3" thick	15
Cement finish, per inch thick	12
Cinder concrete, per inch thick	9
Cinder concrete fill, per inch thick	5
Terrazzo, Tile, Mastic, Linoleum, per inch thick, including base	12
Gypsum slab, per inch thick	5
ROOFS	
Corrugated metal, galvanized:	
20 U. S. Standard Gauge	1.66
24 U. S. Standard Gauge	1.16
28 U. S. Standard Gauge	.78
Roofing felt, 3 ply and gravel	5½
Roofing felt, 5 ply and gravel	6½
Roofing felt, 3 ply and slag	4½
Roofing felt, 5 ply and slag	5½
3-ply ready roofing	1
Shingles, wood	3
Tile or slate	5-20
PARTITIONS	
Channel studs, metal lath, cement plaster, solid 2" thick	17.5
Studs, 2" x 4", wood or metal lath, ¾" plaster both sides	18
Studs, 2" x 4", plaster board ½" plaster both sides	18
Plaster, ½", on gypsum block or clay tile (one side)	4
Hollow clay tile, 2"	13
Hollow clay tile, 3"	16
Hollow clay tile, 4"	18
Hollow clay tile, 5"	20
Hollow clay tile, 6"	25
Hollow clay tile, 8"	30
Hollow clay tile, 10"	35
Hollow gypsum block, 3"	10
Hollow gypsum block, 4"	13
Hollow gypsum block, 5"	15½
Hollow gypsum block, 6"	16½
Solid gypsum block, 2"	9½
Solid gypsum block, 3"	13
Steel partitions	2

MATERIALS	Weight Lb. Per Sq. Ft.
WALLS	
Brick, 8" thick	84
Brick, 12" thick	121
Brick, 16" thick	168
Brick, 20" thick	205
Brick, 24" thick	243
Wall tile, 6" thick	30
Wall tile, 8" thick	33
Wall tile, 10" thick	40
Wall tile, 12" thick	45
Brick 4", tile backing 4"	60
Brick 4", tile backing 8"	75
Brick 9", tile backing 4"	100
Brick 9", tile backing 8"	115
Limestone 4", brick 9"	140
Limestone 4", brick 13"	175
Limestone 4", tile 8"	90
Limestone 4", tile 12"	100
Corrugated metal siding same as roofs	
Windows, glass, frame and sash	8
ASHLAR MASONRY Per Cu. Ft.	
Granite, syenite, gneiss	165
Limestone, marble	160
Sandstone, bluestone	140
MORTAR RUBBLE MASONRY	
Granite, syenite, gneiss	155
Limestone, marble	150
Sandstone, bluestone	130
DRY RUBBLE MASONRY	
Granite, syenite, gneiss	130
Limestone, marble	125
Sandstone, bluestone	110
BRICK MASONRY	
Pressed brick	140
Common brick	120
Soft brick	100

MATERIALS	Weight Lb. Per Sq. Ft.
CONCRETE MASONRY	
Cement, stone, sand	144
Cement, slag, etc.	130
Cement, cinder, etc.	100
VARIOUS BUILDING MATERIALS	
Ashes, cinders	40-45
Cement, portland, loose	94
Cement, portland, set	183
Lime, gypsum, loose	53-64
Mortar, set	103
Slags, bank slag	67-72
Slags, bank screenings	98-117
Slags, machine slag	96
Slags, slag sand	49-55
EARTH, ETC., EXCAVATED	
Clay, dry	63
Clay, damp, plastic	110
Clay, and gravel, dry	100
Earth, dry, loose	76
Earth, dry, packed	95
Earth, moist, loose	78
Earth, moist, packed	96
Earth, mud, flowing	108
Earth, mud packed	115
Riprap, limestone	80-115
Riprap, sandstone	90
Riprap, shale	105
Sand, gravel, dry, loose	90-105
Sand, gravel, dry, packed	100-120
Sand, gravel, dry, wet	118-120
MINERALS	
Asbestos	153
Barytes	281
Basalt	184
Bauxite	159
Borax	109

MATERIALS	Weight Lb. Per Sq. Ft.
Chalk	137
Clay, marl	137
Dolomite	181
Feldspar, orthoclase	159
Gneiss, serpentine	159
Granite, syenite	175
Greenstone, trap	187
Gypsum, alabaster	159
Hornblende	187
Limestone, marble	165
Magnesite	187
Phosphate rock, apatite	200
Pumice natural	40
Porphyry	172
Quartz, flint	165
Sandstone, bluestone	147
Shale, slate	175
Soapstone, talc.	169
STONE, QUARRIED, PILED	
Basalt, granite, gneiss	96
Limestone, marble, quartz	95
Sandstone	82
Shale	92
Greenstone, hornblende	107
BITUMINOUS SUBSTANCES	
Asphaltum	81
Coal, anthracite	97
Coal, bituminous	84
Coal, lignite	78
Coal, peat, turf, dry	47
Coal, charcoal, pine	23
Coal, charcoal, oak	33
Coal, coke	75
Graphite	131
Paraffine	56
Petroleum	54
Petroleum, refined	50
Petroleum, benzine	46
Petroleum, gasoline	42
Pitch	69
Tar, bituminous	75
EXCAVATIONS IN WATER	
Sand or gravel	60
Sand or gravel and clay	65
Clay	80
River mud	90
Soil	70
Stone riprap	65
COAL AND COKE, PILED	
Coal, anthracite	47-58
Coal, bituminous lignite	40-54
Coal, peat, turf	20-26
Coal, charcoal	10-14
Coal, coke	23-32

APPENDIX "B"

TERMITE CONTROL

Strict adherence to the construction principles incorporated in Chapter XVII will provide termite control adequate for all ordinary conditions.

Where additional protection is desired or necessary, either of the following methods may be used:

1. Metal termite shields of not less than twenty-eight (28) U. S. Standard gauge of galvanized steel sheet or other non-corrodible metal shall extend around the entire perimeter of the building and shall cover all piers, foundation walls or other supporting construction. Such termite shields shall extend not less than two (2) inches beyond the piers or foundation walls on all sides and shall be bent downward at an angle of 45 degrees. All joints in such shields shall be overlapped not less than two (2) inches and soldered.

   Shields shall be provided around all service pipes, conduits or any other possible entrance to upper wood members.

2. Foundation timbers, treated with approved wood preservatives may be used as a termite repellant.

APPENDIX "C"

WOOD PRESERVATIVES

All wood preservatives required within the scope of this Building Code shall conform to the following requirements and types of wood preservatives:

1. **Creosote Oil.**
   Shall conform to American Wood Preservers Association Specification for Grade 1 Creosote Oil.

2. **Preservative Salts.**
   (a) Chromated Zinc Chloride.
   (b) Wolman Salts.
   (c) Zinc Meta Arsenite.
   The above salt treatments are recommended for pressure treatment only in accordance with specifications of the American Wood Preservers Association.

3. **Pentachlorophenol:**
   Shall comply with American Wood Preservers Association Specification P8-48 and Federal Specification TTW570. To be used at a concentration of 5 per cent by weight with a suitable petroleum solvent.

4. **Chemonite:**
   Shall comply with Federal Specification TTW549.

APPENDIX "D"

HURRICANE REQUIREMENTS

Lateral Support securely anchored to all walls provides the best, and only sound structural stability against horizontal thrusts, such as winds of exceptional velocity.

This may be obtained by adherence to provisions of Chapters of this Code. They are:

XIII — FOUNDATIONS

XIV — MASONRY

XV — STEEL

XVI — CONCRETE

XVII — WOOD CONSTRUCTION

In the interest of clarity (Sec. 1205.3) the following is recommended:

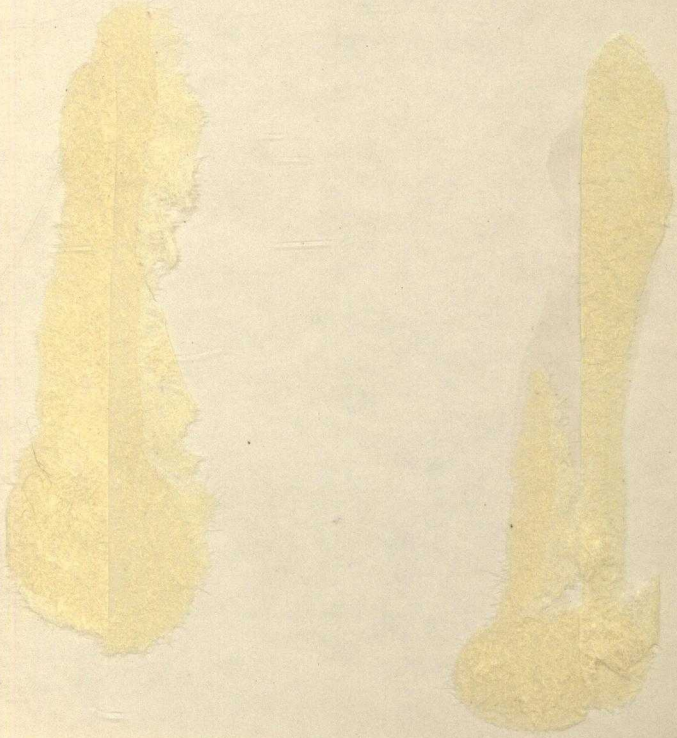
1. TIE BEAMS

A reinforced Tie Beam shall be placed around the perimeter at each floor and roof level, on bearing walls of masonry units, reinforcing shall be not less than four #5 reinforcing bars; Beam size shall be not less than eight (8") inch.

2. CORNERS—HOLLOW MASONRY CONSTRUCTION

In hollow masonry unit construction each unit cell shall be reinforced with at least one #5 bar at all corners; poured solid and tamped with concrete; such reinforcing shall be properly tied into the footing and spandrel beam.

3. WOOD TRUSS RAFTERS—ROOF CONSTRUCTION

All such members shall be securely fastened to exterior walls with approved hurricane anchors or clips.

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